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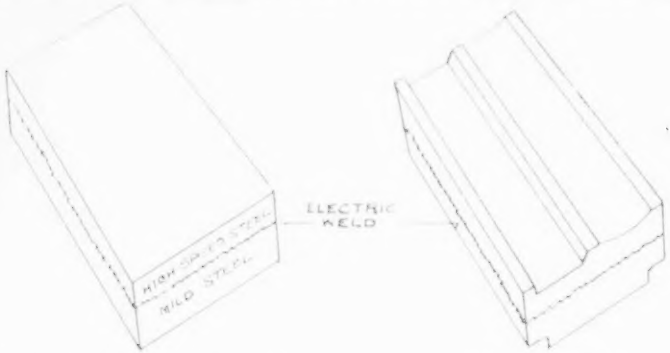

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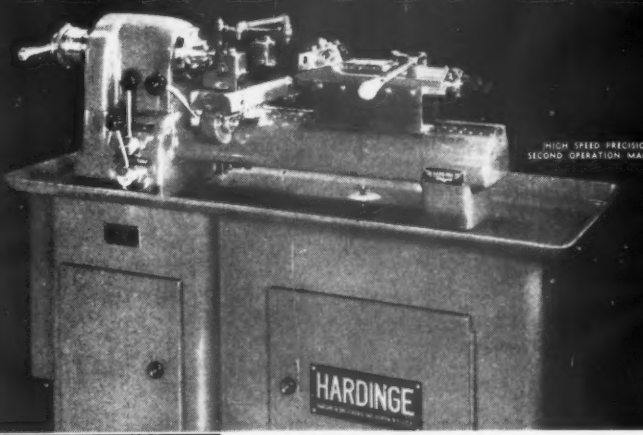

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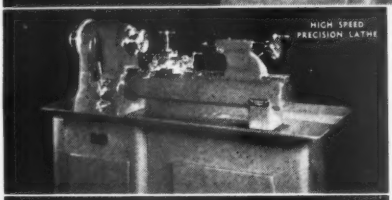

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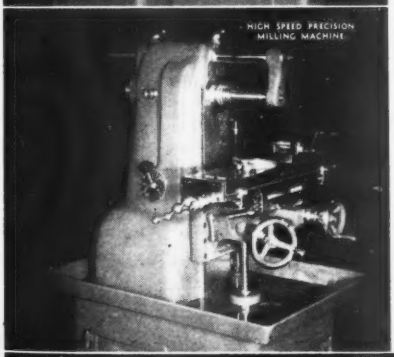

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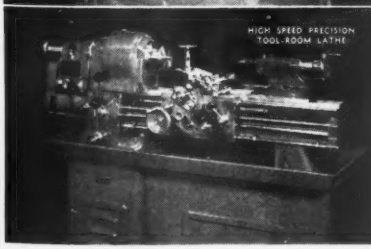

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Contents

Vol. VII, No. 7 OCTOBER, 1941

Sheet Metal Economy in the Pressroom—*C. W. Hinman* 21

Finger Core Pulls in Mold Design—*Thomas J. Lester* 25

Typical Welded Fixtures in Tool Design—*Ed C. Powers* 30

Contract Distribution Offices 40

Production Tools for the Manufacture of Small Arms Ammunition—*Collin M. Doyle* 41

Builders Iron Foundry Announces Gun Barrel Drilling and Reaming Machine 52

Recommended Procedure for Sub-Contractors .. 56

Progress on Parade 64-67

"Cylinder Interchangeability"—*Jack Geers* 68

Recent Industry Publications 72

Buy With Confidence 75-81

Contract Shops 86, 87

Advertisers Index 92

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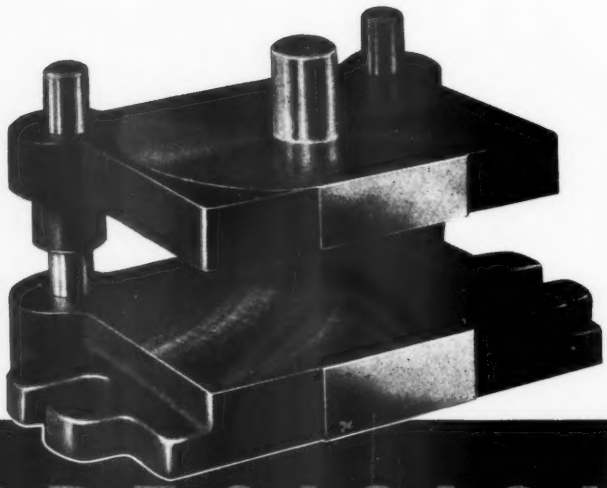

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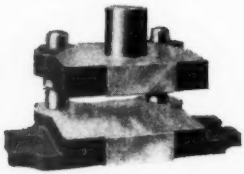

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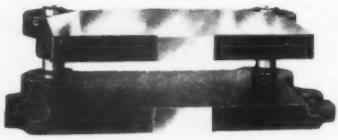

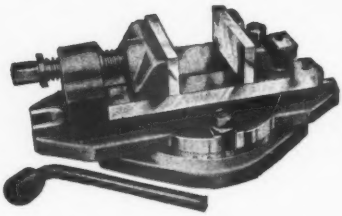

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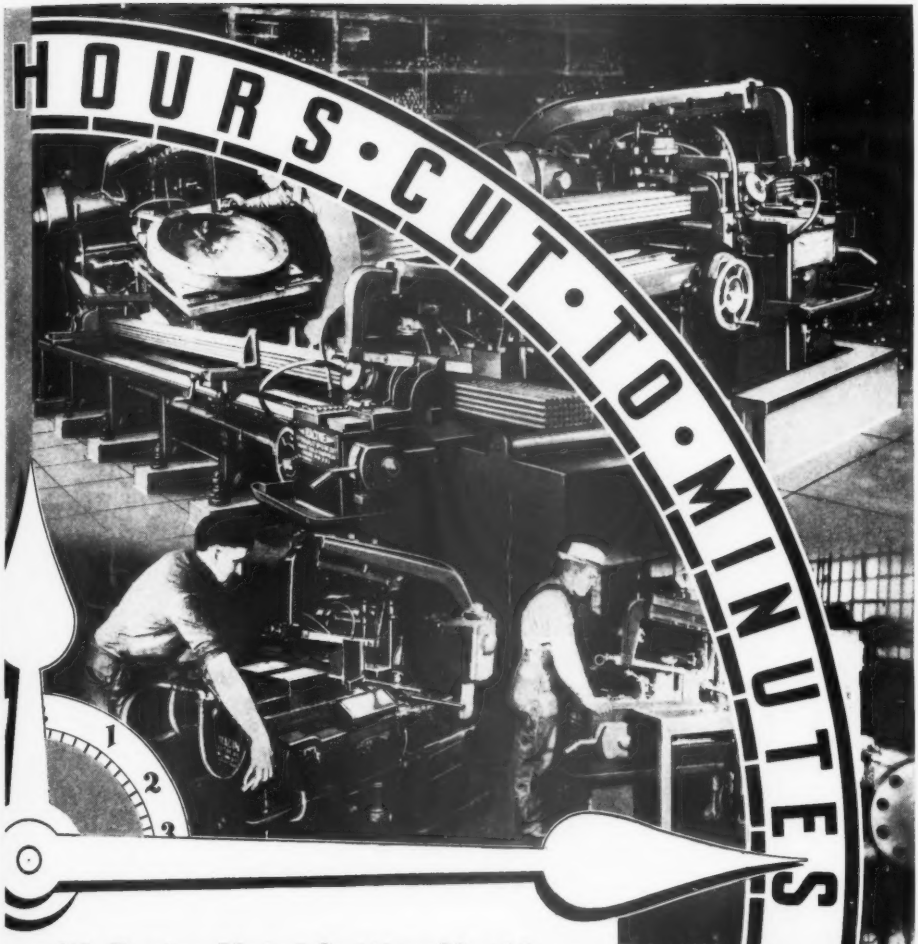

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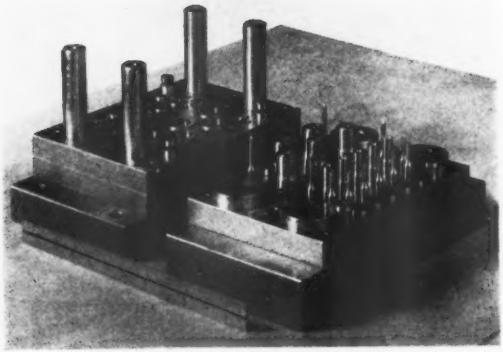

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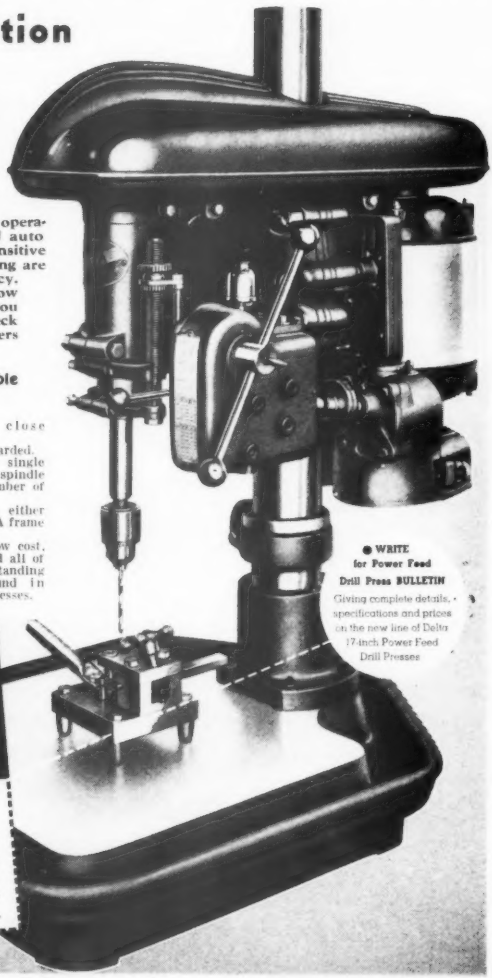

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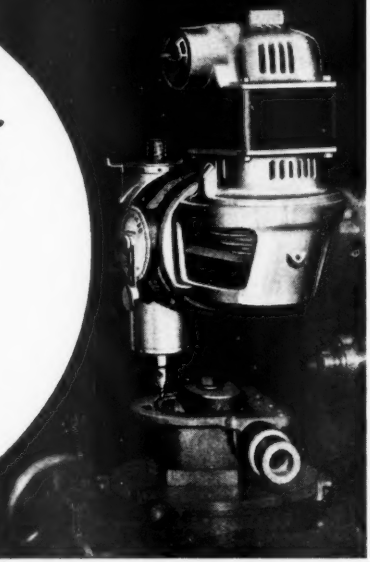

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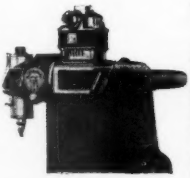

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The TOOL and DIE Journal

TOOL—DIE—MACHINE PROGRESS

OCTOBER, 1941 Vol. 7, No. 7

A Reader Requested Article

This timely article, prepared at specific reader request, points out practical sound procedure in design for the more efficient utilization of metals that are press worked.

This is the first of two articles on this subject by Mr. Hinman, nationally known as a tool and die designer. The second will appear in an early issue.

—The Editor.

Sheet Metal Economy in the Pressroom

By C. W. Hinman

Chief Designer and Tool Engineer

Kobzy Tool and Electrical Mfg. Co.

THE economical utilization of sheet metals in the pressroom has always been a factor of great importance in the press working of metals. Today, with the critical problem of supply, this subject may even overshadow the types of presses used, the design of dies, and high speed production. The advantages, including a legitimate profit, in running a press at high speed production may be nullified, when for example, the scrap may be 20 percent too much.

A job that is highly economical of material, but run on an old style press with poor equipment, may be a more profitable one than a wasteful job run on a modern press which is equipped with the best of tooling designs.

Collaboration

It is indeed an unfortunate situation in too many metal working plants, in which there seems to be an apparent lack of friendly cooperation between the engineers of apparatus and the engineers of tool design. The engineers of apparatus may be the equipment designers, the plant tool layout supervisors or the men charged with production. The engineers of tool design are usually the tool, die, jig, fixture or accessory designer or builder whether the tooling is built in the plant or elsewhere. This cooperation is very desirable because it invariably results in preventing excessive tool expense and waste of work materials. Tool designers often discover that if the shapes of certain piece parts were altered slightly, a far more economical scrap strip could be designed, or a stronger die without expensive inserts, could be built. The mutual advantages of this collaboration are so evident that it is really one of the fundamentals of good team-work. It is also just as im-

portant that tool designers co-operate with the toolroom and pressroom managements, so that they will all have a mutual understanding of each others problems.

Substituting Steel for Non-ferrous Metals

The Defense priority system now in use has caused an unusual scarcity of most non-ferrous metals, so that it has become necessary to substitute steel for many articles formerly made from aluminum, brass and copper. This change has proven to be a profitable one; it can be adopted for many parts except those in which electrical conductivity is involved.

Steel parts can be made of lighter gage sizes if there are no forming dies to change. Other steel parts can be reduced to minimum gage thicknesses, and then strengthened by stamping them with stiffening ribs, embossings, or concentric designs. Many steel parts can be changed to cheaper grades of steel. For example, auto-body steel can sometimes be substituted for a cold rolled product. When such changes as these can be made for parts that run into hundreds of thousands of pieces annually, the saving in material and costs is very substantial.

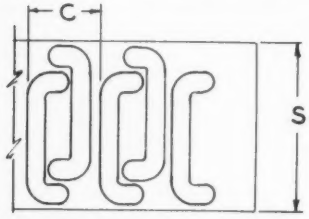

Fig. 1—The first attempt in designing a scrap strip for a straight blank having "hooked ends."

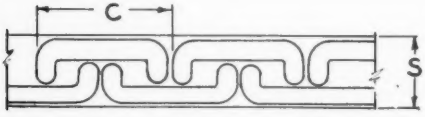

Fig. 2—A more economical layout for the part in Fig. 1. This is the usual scrap strip used for pieces of this type.

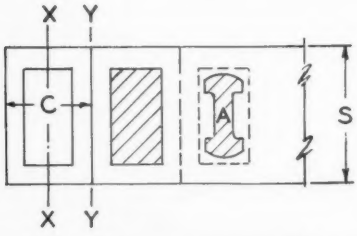

Fig. 3—The most economical layout for the part in Fig. 1. It includes blanking another piece at A.

Laying Out The Scrap Strip

The method of laying out scrap strips for blanks, to assure that the maximum percentage of the strip area is used, is often tedious work. The procedure is to cut three blank templates from cardboard, and arrange them on the drawing board in several experimental positions, until by trial, the most economical arrangement of blanks is found. Comparative areas are determined by multiplying the blanking center distance (C) by the width of strip (S). In case the strip contains multiple rows of blanks, the area of one blank is found by dividing (C x S) by the multiple.

If the blank is to be subsequently bent or formed, especially with sharp cornered bends, care must be used in positioning the blanks relative to the grain in the strip. The ideal bend is made at right angles to the grain, but they can be safely made at an angle of 30 degrees to the grain. The grain direction is usually parallel with the edges of the strip. If this precaution is overlooked, the bends are likely to fracture, especially when they have sharp right angled corners.

Examples of Scrap Strips Taken From Practice

In Fig. 1, we have a tentative scrap layout for blanking the "U" shaped piece shown within the strip. The shape of this piece is a typical one. However, a single glance at this layout shows waste. In fact, this layout utilizes less than 50 percent of the strip.

Fig. 2 shows the usual layout employed for blanking pieces of this shape. The appearance of this layout, for economy, looks better than the one shown in Fig. 1. Some die engineers might be satisfied with this because it represents the con-

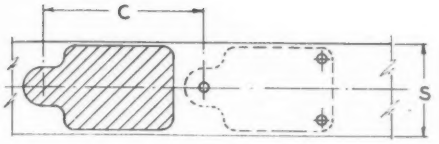

Fig. 4 — Scrap strip for piercing and blanking the piece shown, but using only 65 percent of the strip area.

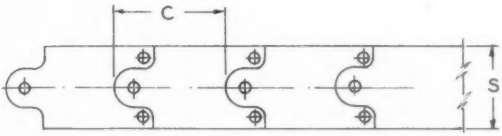

Fig. 5 — Layout for the piece in Fig. 4 which uses practically 100 percent of the strip area.

ventional layout for long pieces with "hooked ends." Nevertheless, this is a wasteful layout since it actually utilizes only 57 percent of the strip.

Final Determination of the Scrap Strip

By interviewing the engineer who was responsible for the design of this piece, it was learned that none of the radial arcs were really necessary since in the final assembly, only the edges of the pieces were visible. Of course someone will say, "Such investigations should have been made in the first place." This argument again emphasizes the value of engineering collaboration.

Fig. 3 is a new scrap layout made for the same piece with all the arcs omitted. Here it was found that another piece part, shown at A, could be incorporated in the same die. For clarity, the die openings in the line cuts are section lined. The two "U" shaped pieces of work are cut apart on line X—X, while one is being cut off on line Y—Y, using a suitable punch in the last station. It will be observed that no scrap-frame remains after the blanks are cut, because width S equals the length of the piece. This layout utilizes nearly 95 percent of the strip.

Saving Metal by Interlocking Blanks

Fig. 4 represents a piercing and blanking layout where a scrap strip is passed out from the die. This is another wasteful layout, since only 65 percent of the strip area required for one blank is used.

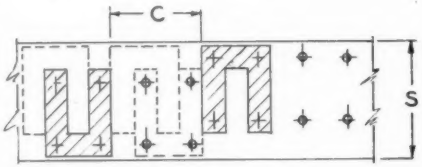

Fig. 6 — A very economical run for "U" shaped blanks.

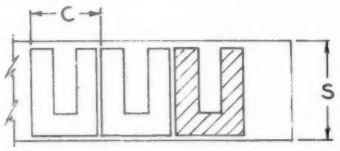

Fig. 7 — Layout for "U" shaped blanks that utilizes only 40 percent of strip.

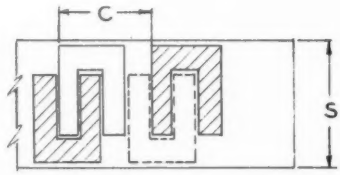

Fig. 8 — Layout for "U" shaped blanks that utilizes 75 percent of strip.

However, by omitting four unnecessary round corners, and by cutting the for-

ward end of the blanks out of the rear end of the blank ahead, and reducing S to the width of the work, a layout is obtained that uses practically 100 percent of the strip, as shown in Fig. 5. Press tools for this type of blanking are called "no scrap dies."

By construction, angles A are equal. cos A = R/C or S/L. Hence, R/C = S/L, and (C x S) = (R x L).

C = (R x L)/S.
R = (C x S)/L.
L = (C x S)/R.

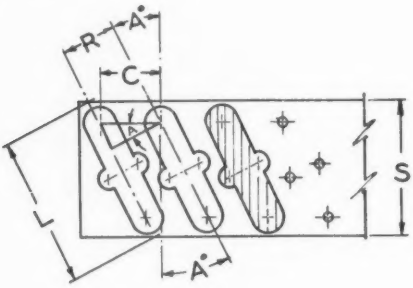

Fig. 9 — This layout is obviously not an economical run for the blank shown.

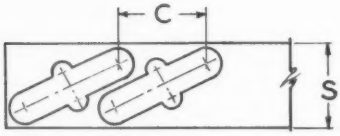

Fig. 10—The blank in Fig. 9 re-positioned to give a 23 percent increase in economy of metal.

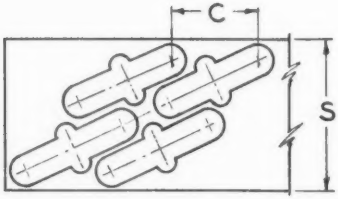

Fig. 11—The piece in Fig. 9 positioned in a double row of blanks that increases metal economy 38 percent.

Miscellaneous Layouts and Formulas for Scrap Strips

Figs. 6 to 8 inclusive, show the developments of scrap strip layouts for typical "U" shaped blanks. Figs. 9 to 11 inclusive, show the saving in metal gained by changing from single to double rows of blanks. Fig. 9 is lettered to suit several mathematical formulas used in checking the correct positions of blanks that lie at an angle across the strip.

Pounds of Stock Required Per 1,000 Blanks

When P is the weight of the material per square foot, and W is the pounds of stock necessary to make 1,000 blanks, then W = C x S x P x 7.3. This formula includes 5 percent allowance for waste ends and miscuts. In all cases, when C and S are intended for blanking multiple rows, the final result obtained by the formula must be divided by the multiple to obtain the weight per 1,000 blanks.

Finger Core Pulls In Mold Design

By Thomas J. Lester

MANY plastics molding problems call for the use of automatic core pulls to withdraw cores in a direction other than the line of travel of the mold. There are a number of methods of incorporating core pulls in the mold—hydraulically, manually, by the use of air cylinders, with cams, by rack gear and pinion, or by using fingers or offset pins. The latter two are the most widely used. This article will treat the last named method —pulling cores by fingers or offset pins.

Because of the molded lettering required on the sides of the weight scale handle shown in Fig. 1, it was necessary to part the mold through the center of the piece in order to make ejection possible. The main cores were then at right angles to the line of travel of the ejector half of the mold.

The two small holes for the handle pin are easy to core in this arrangement at a slight extra mold cost which is much less than the cost of drilling through after molding. Pulling the small cores from two sides of the mold instead of one side, although it means shorter cores and easier pulling, would make the mold more complicated and the cavities harder to machine.

This four cavity mold is of the ejector-pin type with a conventional ejector mechanism arranged to eject the molded pieces after the main cores are pulled. While it is not always good practice to machine the runners in the injection half of an ejector-pin type mold, in this case it is very practical to do so. It will be noted that the width of the runners (detail 9, Fig. 3) is less than the diameter of the combination surface and ejector pins (detail 4). This allows the pins to serve a two-fold purpose—they eject the finished molded pieces and they push the ejector plates back to the molding position when the mold closes. This provides a larger ejecting surface with fewer pins.

There is no chance of the shot sticking to the injection half of the mold even though the runners are cut in that side. The reason is that the main cores are held in the ejector half by the core guide block (detail 34), which is screwed to the ejector half (detail 25). The guide block insures that the main cores will travel back with the ejector half as the mold opens. The main cores will pull the pieces out of the injection cavity halves long before the cores themselves are withdrawn completely from the pieces. The undercut sprue pin (detail 16, Fig. 3) will pull the sprue out of the bushing and will not release it until the pin is lifted by the ejector plates. The large surface pin (detail 13, Fig. 2) balances the forces on the ejector plates and insures their even return to the molding position.

Construction Features

The injection or cover half of the mold consists of the following parts: Cover binder plate (detail 8), injection side binder shoe (detail 7), cover or sprue center block (detail 19), sprue bushing (detail 10), cavity binder block (detail 33), finger or core pins (detail 28), small core pins (detail 31), and injection half cavity blocks (detail 40).

Side binder shoe (detail 7), center block (detail 19), cavity block (detail 40), and cavity retainer block (detail 33) are all fastened and doweled to cover binder plate (detail 8). This plate is counterbored for the finger or core pins. Sprue bushing (detail 10) is a press fit,

and finger or core pins (detail 28) are held in the cover binder plate by a shoulder provided for this purpose. A suitable hobbing material is utilized for the cavity blocks as raised letters appear in the cavity and machining of these cavities would be out of the question. Of course, if letters were to be embossed later on, the cavities could be machined.

Cover binder plate (detail 8), injection side binder shoe (detail 7), injection center piece (detail 19), and cavity retainer block (detail 33) are made of alloy steel. The sprue bushing (detail 10) is machined with a ball seat (detail 11) for abutment with the injection machine nozzle. It will also be noted that the sprue bushing extends beyond the cover binder plate. This is for alignment with the machine in setting up.

Guide pin bushings (detail 20, Fig. 3) are shown on the ejector half; these pins should appear only on the injection mold half. They are shown in Fig. 3 for location only. After the above mentioned parts have been assembled and small core pins (detail 31, Fig. 4) with peened heads have been inserted in the injection cavity blocks, the gating and runners are milled as shown (detail 9, Fig. 3). The injection half is then completed with the exception of the finger or core pins, provisions for which will be machined after the mold is completed.

Ejector Half of Mold

The ejector half of this mold consists of the following parts: Details 3, 4, 5, 13, 14, 15, 16, 17, 18, 21, 23, 25, 26, 27, 28, 29, 30, 31, 34, 35, 37 and 39. This mold half is fastened to the movable mounting plate of the machine, the clamping provisions being the clamping shoulder (detail 2). As in the injection mold half, the cavities are hobbed in the ejector cavity blocks (detail 39). The blocks are squared and ground for accurate fit in the mold shoe, and assembled to the ejector binder plate (detail 17). The ejector die shoe (detail 6) is machined and assembled in the same manner as is the die shoe in the injection half with the exception that instead of

Principal Parts

1. Ejector rod
2. Clamping shoulder
3. Ejector plate
4. Combination ejector surface pin
5. Water hole
6. Injection half side binder shoe
7. Cover injection half side binder shoe
8. Cover binder plate
9. Runners and gating
10. Sprue bushing
11. Nozzle adapting surface
12. Finger angle
13. Surface pin
14. Ejector box
15. Ejector pin retainer plate
16. Sprue pin
17. Ejector binder plate
18. Ejector center block
19. Injection center piece
20. Guide pin bushing
21. Guide pin
22. Cavity (molded piece cross-section)
23. Support posts
24. Ejector box opening
25. Socket head screw and lock block
26. Finger support
27. Support post
28. Finger core pull pin
29. Core pull block
30. Gibs
31. Small core pins
32. Cavity
33. Injection half cavity retainer block
34. Core guide block
35. Cores
36. Thread portion of cores
37. Lock nuts
38. Finger clearance opening
39. Ejector cavity block
40. Injection cavity block

providing for guide pin bushings four holes are bored for a press fit with the guide pins. The core guide block (detail 34) and the gibs (detail 30) are then fastened by socket head screws through the ejection binder plate (detail 17). After the core pull block (detail 29) has been machined for outside dimensions and gibs, it is placed on the gibs and is held tightly against the core guide block (detail 34) and is machined together with the block for core provisions (detail 35). The holes are now machined in the ejector binder plate (detail 17), ejector center block (detail 18) and cavity (detail 39) for surface, sprue, and combination surface and ejector pins.

The cast iron, Meehanite, or cast steel ejector box is now machined on the ejector plate surface by end mill. The surfaces which are fastened against the machine and the ejector binder plate (detail 17) are then machined and

Fig. 1—Weight scale, showing handle for which the mold was used.

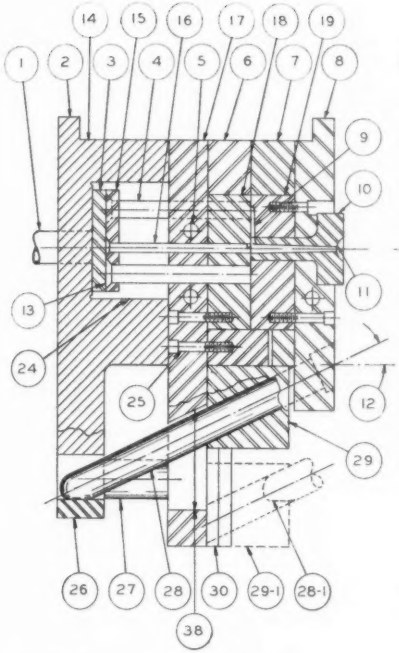

Fig. 2—Sectional elevation of ejector-pin type injection mold.

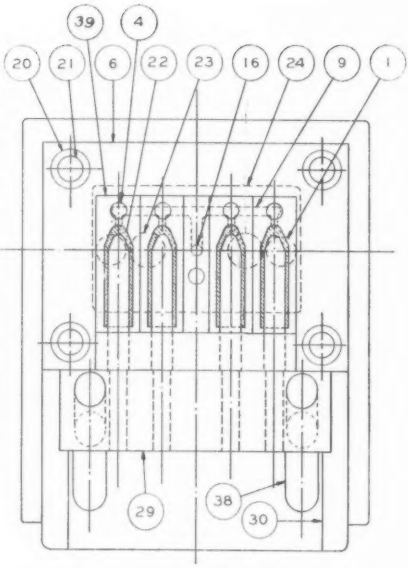

Fig. 3—View facing the injection half.

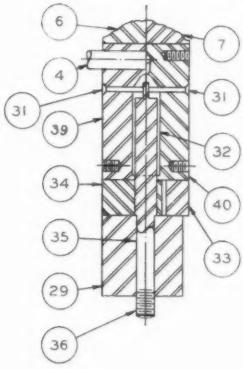

Fig. 4—Cross section of cavity at parting line.

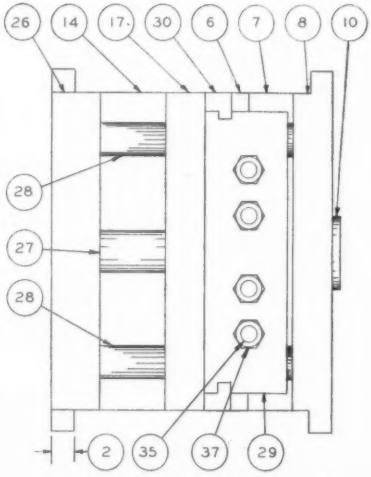

Fig. 5—Core side view of mold.

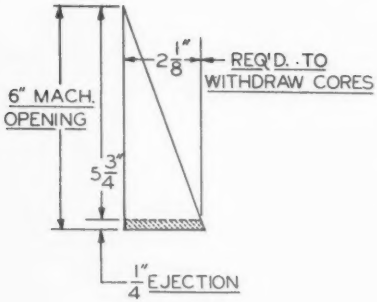

Fig. 6

ground, after which a surface is machined for assembling the finger support lock block (detail 26). The ejector box is now ready for assembly to the ejector binder plate by socket head screws after three support posts (details 23, Fig. 3 and 27, Figs. 2 and 5) are attached. The two posts (detail 23, Fig. 3) in the ejector box opening (detail 24) are to prevent the mold from collapsing into this opening under high injection pressure; and the support post (detail 27, Fig. 5) insures rigidity between the ejector box (detail 14) and the ejector binder plate (detail 17). It has been found that if the core block (detail 29) is not held rigidly, the cores are subjected to score wear and, in extreme cases, to flash through the diameters or sections where the cores enter the cavities.

Machining for Core Pulls

The mold halves are now placed together and the core block (detail 29) is again clamped tightly against the core guide block (detail 34).

Holes for the fingers (detail 28, Fig. 2) must be bored through the cover binder plate (detail 8), the core block (detail 29) and the ejector binder plate (detail 17) while they are clamped together. The hole in the ejector binder plate should be enlarged about $\frac{1}{8}$ inch and then an opening (detail 38) should be formed to provide ample room for the finger travel as the die opens. The ejector end of the finger is ground flat and the finger support lock block (detail 26) is fastened to the ejector box so that when the mold is closed the ground surface of the pin rides on the block for about one inch. The reason for the lock block is to insure support at both ends of the core pull pin (detail 28) when injection pressure builds against the core.

It is important, if not absolutely necessary, for the mold designer to know something about the machine in which the mold is to be operated. He must know the machine opening, the ejector rod sizes and their location, the type of nozzle, the size of the mold-mounting plate, the minimum and maximum die spaces, and the distance between beams or bars. In the case of this mold, the designer has determined that it was to be run on a 4-ounce machine with a six-inch opening. When the angle (detail 12, Fig. 2) for the core pull finger is computed, there are several considerations to keep in mind: The machine opening, the size and number of cores, the finger angle desired, the ejection space required, and the amount of distance the core has to travel in order to be withdrawn from the molded article. In this case four cores must be withdrawn 2⅛ inches; the ejection required is one-quarter inch. This means that when about 5¾ inches of the opening movement is accomplished the cores will have been withdrawn from the plastics molding and the ejection will start to take place. Therefore, from these figures the angle of 22 degrees was determined (see Fig. 6). When the six inches of the stroke has been completed, the core block will be in the dotted position (detail 29-1) and the fingers in position as shown by (detail 28-1).

Many molds have been built with short fingers and a steep angle. This means that the fingers withdraw completely from the core block, which is held against a stop by springs, so that when the fingers return they will re-enter the block holes. This is not the best practice, however, as there is danger of the hardened fingers missing the holes and bending or breaking. There is a definite mechanical advantage in long fingers since longer fingers permit small angles. There is also less strain on the injection machine. If the desired core pull requires an angle of more than 25 degrees, the designer, after considering the type of core to be pulled, taper, size, etc., should select another method of pulling his cores—possibly by rack gear and pinion. It is important not to make the cover binder plate or the fingers too thin.

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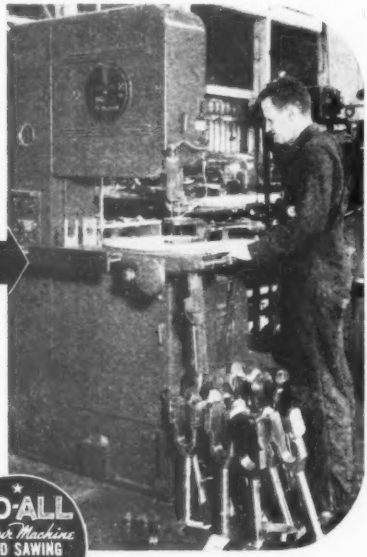

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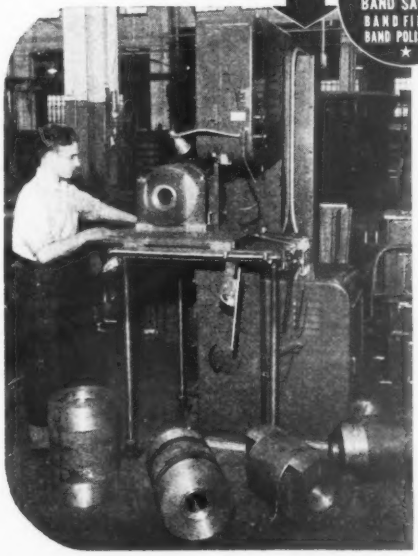

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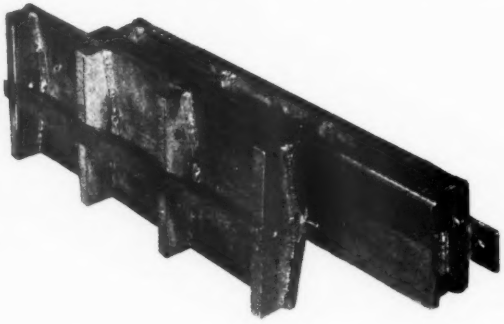
Typical Welded Fixtures in Tool Design

By Ed C. Powers

AT the present time, the demand for speed, and yet more speed, in getting Defense products and parts into production calls on the ingenuity of every tool designer to cut every possible corner in getting his jigs and fixtures as well as dies and special tools constructed and at work. One factor that has played an important part has been the applications of welding, particularly in the production of stronger and lighter jigs and fixtures.

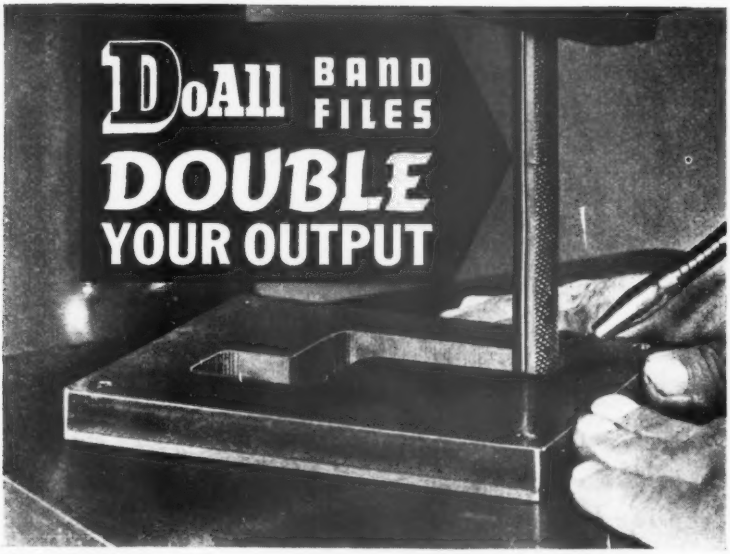


The welded fixtures illustrated are examples of the tendency toward the use of arc welding which offers a number of advantages. Formerly the two long fixtures or channels would have been cast —a costly process involving a pattern cost as well as storage and maintenance of records for subsequent use. In many cases, patterns become worthless due to climatic conditions and construction. In order to maintain the necessary strength and accuracy, the designer would add sufficient weight to such a fixture to stand a certain amount of abuse which some operators consider justifiable and to allow for alterations in the fixture made necessary by changes in the design of the work. Such alterations naturally must be kept in mind since they necessitate removing material from the fixture which may weaken it. In many instances changes may require that the fixture be scrapped, considerably increasing the tool cost.

A designer often prefers a design that can be dismantled to suit engineering changes. Such a fixture becomes costly due to machining of parts, plus the cost of drilling and tapping of holes which hold the pieces together. This type of fixture is successful if properly fitted and doweled, but after repeated production runs it loses its accuracy due to handling and storage as well as normal wear.

It is quite evident that the first object in designing is simplicity and careful study should be given to the support of parts upon which rests the greater portion of the weight of the fixture or the indirect stresses caused by machining of

(Continued on Page 32)



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Allegheny-Ludlum Names Sherman in East

ANNOUNCEMENT was recently made of the appointment of Coolidge Sherman as Eastern manager. In his new capacity, Mr. Sherman will act as coordinator of sales in all districts of the Eastern seaboard. These include Allegheny Ludlum offices in Birmingham, Atlanta, New York and Springfield and distributors located in these districts.

Typical Welded Fixtures

(Continued from Page 30)

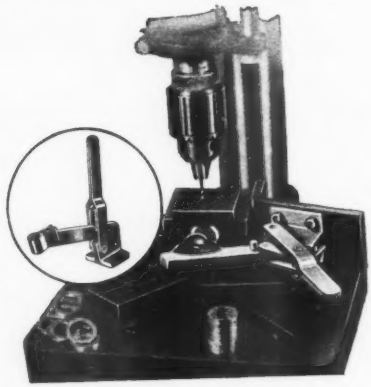
parts in the fixture. After considering where the load is concentrated, provisions are made to avoid springing and this is accomplished by proper ribbing. Welding permits somewhat lighter ribbing than required in cast iron tools. These braces may be cut out in the center to decrease weight and still maintain their strength. In some of the larger fixtures it has been possible to eliminate as much as one-third of the original weight.

The cost factor indicates a definite advantage for welding. In the right hand fixture shown in the illustration, the actual comparison as furnished by the tool designer of a leading industrial plant is as follows:

Cast Iron Fixtures	
Pattern Cost	$20.00
Materials, including labor	20.00
	$40.00
Welded Fixture	
Material	$ 6.00
Labor	6.00
	$12.00

After all of this has been considered, a drawing is prepared, giving material specifications showing item numbers and sizes. The welder, therefore, finds himself in a better position to understand the work which confronts him. However, he generally sets up the parts on the base plate, or bed, and squares them up in relation to each other. He then tacks the pieces together to make sure they fit properly.

Another advantage for welded design of jigs and fixtures is that changes can be made or additional parts welded on, thus eliminating the fear of having to scrap the fixture due to minor alterations. In summarizing the advantages of welded fixtures it is quite obvious that these tools are adaptable, practicable, and that definite savings in first cost, engineering changes and time of fabrication can be made.



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Carborundum Exhibit to Open in Chicago

THE Carborundum Company, Niagara Falls, N. Y., announce the opening of an educational exhibit at the Chicago Museum of Science and Industry October 16.

The detailed processes involved in creating the two abrasives, Carborundum Brand Silicon Carbide and Aloxite Brand Aluminum Oxide, are portrayed in a series of diaramas showing scale models of the electric furnaces in which these abrasives are produced.

A decidedly unique feature of the exhibit is the Hardness Test. Visitors are able to determine for themselves, by means of this test, the relative hardness of various materials, ranging from the diamond to talc and including glass, tool steel, silicon carbide, aluminum oxide, marble, etc.

The exhibit includes turntables divided into sections which carry examples of various products which have been ground, finished or sanded by the grinding wheels and the coated abrasives manufactured by The Carborundum Co. On display are extremely accurate and perfectly finished automobile and airplane parts and various tools such as reamers, drills, milling cutters, cemented carbide turning tools, etc.

Visitors will also have opportunity to see and hear a sound film depicting Dr. Acheson re-enacting his first experiment as well as an intimate trip through the Carborundum plant showing the electric furnaces in actual operation, and other scenes in the steps of manufacture of abrasives and abrasive products.

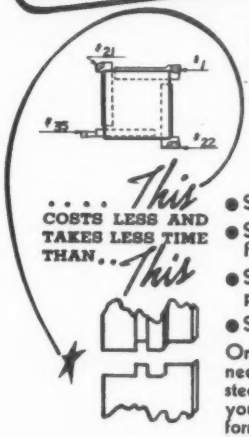
Sheffield Corporation Awards Two Scholarships

Two five-year scholarships to the Department of Mechanical Engineering, College of Engineering and Commerce, University of Cincinnati, were awarded by The Sheffield Corp., Dayton, O., to two of its younger employees, Howard Gebhart and Carl L. Hoffmeyer. The awards were won in a series of competitive examinations, open to all eligible employees of the Corporation. The Sheffield Corporation, the second largest industrial gage plant in the world, has been conducting a Defense training program since the beginning of the Defense emergency.

See New Defense Section, Page 39

BEFORE YOU MAKE . . . . EXPENSIVE FORM TOOLS

Investigate KENNAMETAL Single Point Carbide Tools



By substituting standard single point KENNAMETAL tools in turret lathes in place of intricate form tools for your steel-cutting operations, you can in many cases:

- Save time getting started.
- Save time during actual machining.
- Save expense of replacing costly form tools.
- Save excessive tool pressure on work piece, chuck, and machine.
- Save grinding time.

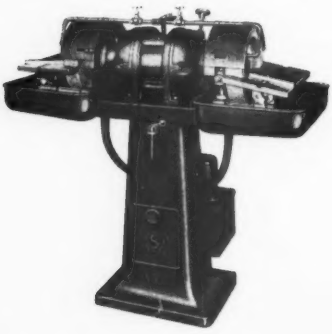
On your next job, let a McKenna engineer show you how KENNAMETAL steel-cutting carbide tools can save you the time and expense of making form tools. Send us your blue print for a detailed analysis.

McKENNA METALS Co.

500 LLOYD AVE., LATROBE, PA.

FOREIGN REPRESENTATIVES: U. S. STEEL EXPORT CO. Exclusive of Canada, Great Britain and Possessions

Standard Announces New High Speed Tool Bit Grinders for Carbide Tipped Tools



DESIGNED especially to meet the needs of manufacturers using carbide tipped tools, a high speed tool bit grinder for wet or dry grinding has just been announced by The Standard Electrical Tool Co., Cincinnati, O.

A popular feature of this machine is that while each wheel is equipped with a wet grinding attachment, a separate toggle switch operates the motor driven pump for dry grinding.

Manufactured in three sizes, one is equipped with a 2 hp 1750 rpm motor using either 12" diameter cup wheels or steel back cylindrical wheels. Also available with 1 hp motor for 10" wheels. The 14" machine is powered by a 3 hp 1150 rpm motor.

Equipment includes motor driven pump with tank; guards adjustable to wheel wear; table with angular, vertical and lateral movements; grooved top table with adjustable fence for resting tools being ground; trough or splash bowl at each wheel with hose connection for gravity return of lubricant to tank; piping from pump to each wheel with valve for controlling flow of coolant; reversing starter for selected rotation of wheels; precision ball bearings.

This equipment is also available as a Combination Wet and Dry Grinder.

Ask for Catalog 43-T giving complete information on the new Standard high speed tool bit grinder. Address The Standard Electrical Tool Co., 1945 W. Eighth St., Cincinnati, O.

STARRETT TOOLS

The men—and the shops—that have always believed it pays to standardize on STARRETT TOOLS are being repaid a hundredfold. They appreciate now that the extra accuracy and extra convenience of STARRETT TOOLS means more work and better work on any job and under any conditions. Write for Catalog No. 26 "DM".

THE L. S. STARRETT CO.

World's Greatest Toolmakers

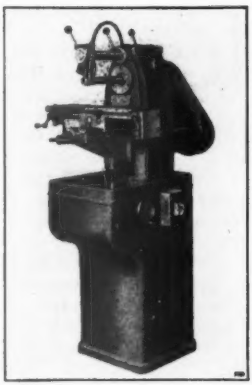
Precision Tools . . . Dial Indicators . . . Ground Flat Stock Hacksaws . . . Metal Cutting Bandsaws . . . Steel Tapes

ATHOL, MASSACHUSETTS, U. S. A.

Standardize on STARRETT TOOLS

BUY THROUGH YOUR DISTRIBUTOR

Jackson Horizontal Mill Designed for Small Precision Work



THE Jackson No. 1 Horizontal Milling Machine, designed for tool room, experimental and production work that can be most efficiently and economically done by a small precision unit, is the latest addition to the line of the Jackson Machine & Tool Co., Jackson, Mich.

Rigidly constructed throughout, of quality materials, all column, knee, saddle and table ways are V-shaped, scraped and flaked after machining for maximum precision and wear. The No. 1 Horizontal Mill has a spindle of chrome nickel steel, machined for No. 3 Morse Taper. A No. 9 B&S Taper is available at slight additional cost. Spindle speeds, through V-belt drive from 70 to 500 rpm are controlled through Speedmaster variable pulley. Speed ranges up to 3000 rpm are available by installation of higher speed motors and special pulleys. Main spindle bearings —3½" OD and 1.970" ID—are super-precision preloaded ball bearings, 3 single row, sealed and lubricated.

Table feeds—vertical 7½" maximum, longitudinal, 12" maximum, transverse, 5¼" maximum—have micrometer adjustments. Longitudinal power feed is standard. All bearing surfaces and general alignment of working parts are gage tested.

The No. 1 Jackson Horizontal Mill will handle ⅜" cut, ¾" deep in solid steel at one cut. Adequate lubrication throughout is provided, with oil feed reservoir cups at all bearing surfaces. Coolant tank is enclosed in base and power coolant system is optional.

For specifications and prices of the No. 1 Jackson Horizontal Milling Machine, Write Jackson Machine & Tool Co. Sales Division, 956 Roberts St., Jackson, Mich.

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RIGHT THROUGH is right, just as you've been drilling soft steel. For example, you can drill gauge pin holes and screw and dowel holes in hardened die sections without removing. No more rejects from holes oversized, warped, distorted or not matching in hardened pieces. Great savings are possible. Get the facts now!

We'll see you at Philadelphia!

HARDSTEEL DRILLS

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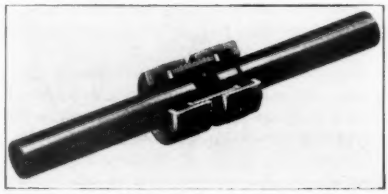
Harris Announces New Flexible Couplings

HARRIS Products Co., Detroit, Michigan, announce that a new flexible coupling, which can serve as a connecting medium for oil lubricating lines as well as a coupling capable of transmitting torque, compensating for parallel or angular misalignment, reducing noise and vibration and smoothing out power impulses, has been added to the Torflex line.

Any size shafting between ¼ inch and ⅞ inch inclusive can be handled by the new coupling. In order that any one coupling can be used with shafting of different diameter, the bore of one cap, bushing and washer of a coupling is increased to accommodate the larger size shafting. These alternate sizes can be carried in stock along with the standard sizes to effect a considerable reduction in inventory.

The couplings can be pre-assembled,



or can be put together "piecemeal" on the two shafts. Since rotating the drive shaft serves to tighten the couplings, they can be assembled by this means. Grooving the drive shaft to a depth of ⅛ inch is all the preparation required; milling, keyseating, etc., being unnecessary.

Distances between shaft ends should be approximately ⅜ inch but the essential requirement is that the ends of the shafts must project through the rubber bushings. The couplings can be removed from the shafts for inspection or replacement of rubber bushings by merely unscrewing the caps.

Further information on the new Torflex flexible couplings will be sent by Harris Products Co., 5432 Commonwealth Ave., Detroit, Mich.

Extra Point!
THE MARGIN THAT WINS PRODUCTION BATTLES . . . .
In football, it's an "educated toe" . . . in grinding it's a "precision" machine that gives you the winning margin. The Hammond "6" (right) measures Carbide Tool grinding angles with hair-line accuracy. Tables tilt easily . . . lock in position or remove with a flip of one lever . . . motor reverses. Everything combines to give top quality, ease and precision in Carbide Tool Grinding. Write for Bulletin NOW!
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HAMMOND MACHINERY BUILDERS, INC.
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Eastern Branch: 71 West 23rd Street, New York City
TEAR OUT . . . MAIL TODAY FOR BULLETINS GP-3 AND 5.

An Apology

We omitted the word "gages" from the advertisement of the Star Machine and Tool Company, Cleveland, O., in our September issue. This company builds many types of gages including plug, ring, snap, profile, length and flush pin.

New Lightweight Aro Pneumatic Grinder

ARO Model 22GBS Grinder, recently announced by The Aro Equipment Corp., Bryan, Ohio, has been designed to meet the demand in aircraft and other precision shops for a pneumatic grinder which is compact and sufficiently light in weight for one-hand operation. Only 6¼" in overall length and with a speed of 17,000 rpm for wheels up to 2", the new grinder has been introduced only after extensive tests in actual use in aircraft and other industrial shops. It is equipped with large precision type

ball bearings and is available with either lever or button throttle and with spindle extension and collets of various sizes.

Model 22BGS Grinder is described in detail in Aro Catalog No. 41, which is available upon request. Address Aro Equipment Corp., 114 Madison St., Bryan, O.

Advanced Cutting Fluid Makes Remarkable Records

RECENTLY improved, the "Advanced" Cutting Fluid, made by the Advanced Cutting Fluid Co., Detroit, Mich., has made some remarkable records in shop tests in allowing greater cutting speeds and in providing longer tool life.

"Advanced" Cutting Fluid is a chemical combination rather than a vehicle for resin, soap fillers, sulphur or other sediments. In addition to the elements which develop an improved soluable oil, the emulsification now being added is part of a modern manufacturing method.

The economy of "Advanced" Cutting Fluid for all types of metal cutting is noteworthy—up to 50% in cutting time, 60% in tool cost and up to 80% in cutting fluid cost compared to cutting oils. The savings will be similar to those derived by the application of cemented carbide tools as compared to high speed steel tools.

A circular, "Advanced" Cutting Fluid, giving efficiencies and uses of standard mixes will be sent on request. Address Advanced Cutting Fluid Co., 1620 Porter St., Detroit, Mich.

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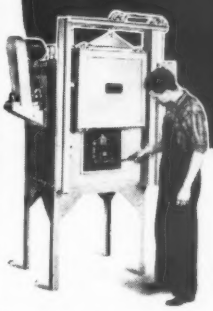

Accurate—Uniform—Flexible—Convenient—Speedy—Range 275° F. to 1250° F.

DESPATCH UTILITY FURNACES equipped for either Despatch Gas "Controlled Combustion" Heater or Despatch Electric Heater.

See Despatch Display at the National Metal Congress and Exposition October 20th-24th, or write for Bulletin No. 83-O.

DESPATCH OVEN COMPANY MINNEAPOLIS MINNESOTA

Timken Builds Record Size Bearings for Aluminum Mill

FOUR Timken tapered roller bearings, manufactured by The Timken Roller Bearing Company, Canton, O., and installed on the back-up rolls of the new, 4-hi, reversing hot mill of Aluminum Company of America mill at Alcoa, Tenn., have 30 percent more capacity than any bearings ever built.

The illustration at the left compares smallest Timken tapered roller bearing used on automobile generators, with the new larger capacity bearing. The small bearing has a bore of .3750 by 1.2595 outside diameter by .3940 width. The large bearings have a 35½" bore by 51" outside diameter by 36" width. They weigh 9,070 pounds each and have a mill separating force capacity of 8,300,000 pounds at mill speed.

Each bearing is a four cage assembly with 34 machine turned, case carburized rolls per cage, or a total of 136 rolls per bearing. Individual rolls are 4 inches in diameter, 7¼ inches long and weigh 23.37 lbs.

The cones and cups are forged. The cages are turned.

Complete information on the Timken largest capacity bearings is available from The Timken Roller Bearing Co., Steel and Tube Div., Canton, O.

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Telephone CHerry 6818

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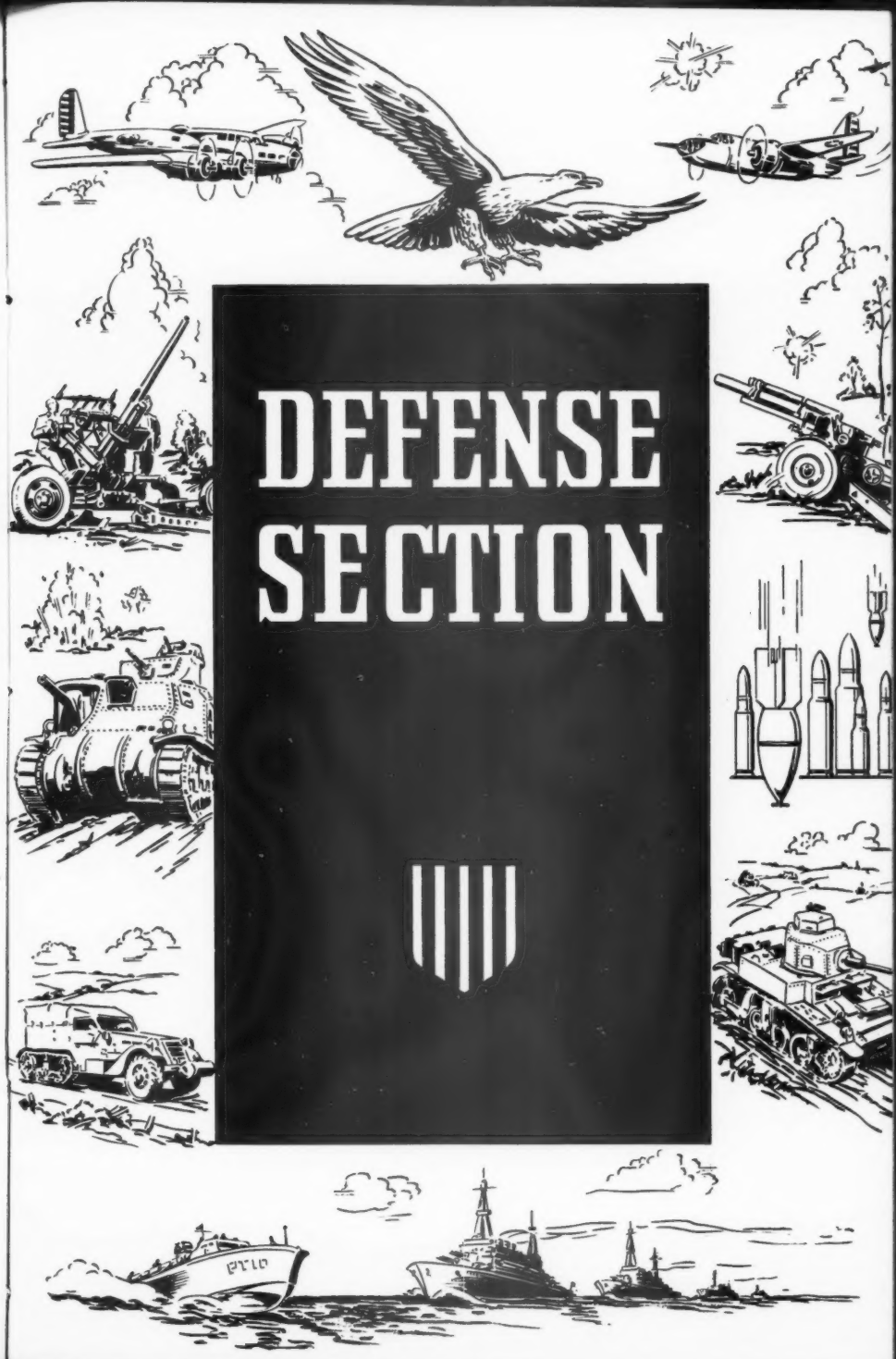
Die Designing and Estimating

New second edition, delayed to include additional material, is now ready for the press. Largely rewritten with 50 percent new material and shop contributed Practical Points.

Pre-publication price $2.50 per copy, postpaid.


DEFENSE
SECTION

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Recommended Procedure for Sub-Contractors, Turn to Page 56

Drawing Punches and Dies

The Importance of Accuracy and Heat Treatment

Article One of a Series

By Collin M. Doyle

Engineering Section, Military Division
Remington Arms Company, Inc.

This series will present selected, basic information on a major armament program. Prepared by qualified engineers at the request of the Office of the Chief of Ordnance, the text and drawings are chosen to give the Contract Tool and Die Shops and other shops capable of producing precision work a definite understanding of the requirements of this type of work.

Facilities to do operations of this character are urgently needed. Quantities of perishable tools involved are enormous. Shops, departments or companies whose equipment will permit are urged to get in touch at once with the nearest Contract Distribution Division Field Office.

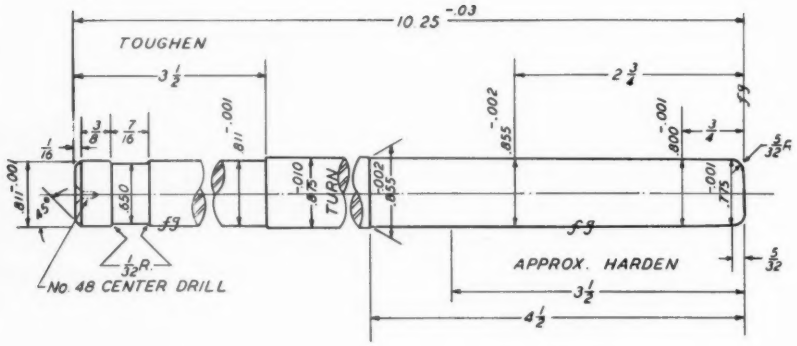
—The Editor

THE six Small Arms Ammunition Plants which are now under construction in the Middle West as part of the Defense Program will require large quantities of production or expendable tools. A large percentage of those tools will be purchased on the open market and some idea of the character of these tools may be of general interest to the Tool and Die trade.

The design and manufacturing methods of the .50 caliber cartridge has been well described in the September 3rd issue of "The American Machinist" so no further description of the cartridge itself seems necessary and the following discussion will be limited to the tools for manufacturing that cartridge. The .30 caliber cartridge and the tools for manufacturing it are similar in style and number but, of course, smaller in size.

To produce vast quantities of small arms ammunition that will pass the exacting requirements of governmental inspection, the production tools must of necessity be extremely accurate. "A product can be no better than the tools which produce it." "Inspection does not produce ammunition." For the production of cal. .50 machine gun ammunition, a large quantity of expendable tools must be manufactured and the accuracy of these tools and their "production life" depends entirely upon the technique of the tool maker and heat treating specialists.

It is useless to present a tool to the Production Department with accurately machined dimensions if the hardness and other physical properties of the tool are not correct.

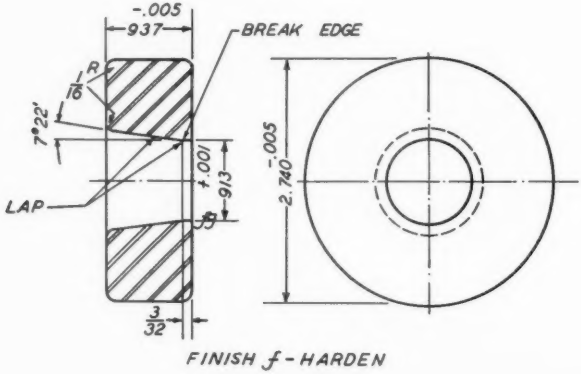


PUNCH
FINISH f

Fig. 1

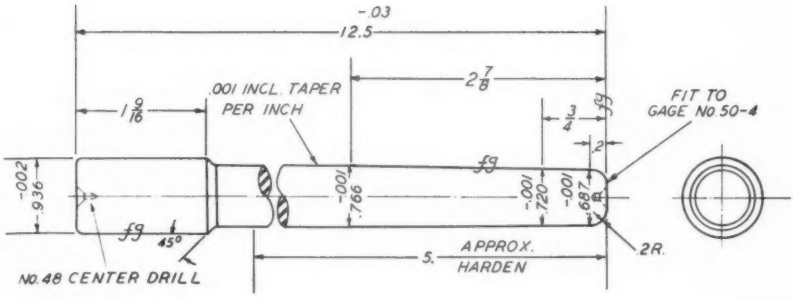
In the manufacture of the cal. .50 cartridge case, the metal is formed to the desired shape by a series of draws. Fig. 1 shows the punch for the second draw. Fig. 2 shows the die for the same operation. If we examine the decimal dimensions on the punch we readily see that the tolerances are not particularly close. However, while the permissible variations will permit the punches to be accepted, it is preferred that the indicated dimensions be held very closely. For example, a punch that calls for a dimension of .800" minus .001 is not as acceptable as the one holding the dimension of .800" exactly.

This can be readily understood, when it is explained that the punch with the minus tolerances will not permit polishing to remove small scratches without it being worked to an under-size dimension that would make it "scrap." In other words, a punch held to .800" would permit a polishing salvage operation, whereas a punch finished to .799 would permit but very little polishing. Consequently,



DIE

Fig. 2



PUNCH

Fig. 3

the life of the latter punch would be considerably less than the one machined to .800".

Finishing

The punch referred to is a very important production tool and its life can be measured by the finishing or polishing. A punch that is highly polished so that the "polished lines" are parallel to the axis will have a much greater life than a punch cylindrically ground and polished. This variance in life is explained by the fact that in the drawing operation a cylindrically ground and polished punch will cause microscopic brass to adhere to its surface and difficulty in stripping is experienced, whereas, a punch polished so that the "polished lines" are parallel to the axis, does not permit brass particles to adhere to its surface and as a consequence the stripping operation is simple. This polishing technique is very important and adds considerably to the life of the punch.

Heat Treatment

The surface of this punch, for approximately 3½ to 4", must be extremely hard, whereas the core and the shank may be of less hardness, but by the same token, tough. It is important when heat treating punches of this type that the atmosphere in the heat treating furnace does not decarburize the surface too deeply, neither must the atmosphere be of such a nature that the surface will oxidize excessively. Extreme care must be taken to see that the working surface of this punch is of the maximum hardness, and that sufficient amount of "grind stock" is left to permit the removal of any decarburized or oxidized areas. The "angle of quench" is also very important so that the minimum distortion takes place.

To temper or draw a punch of this type, it is foolhardy to resort to the practice of "tempering by color". Tempering must be done positively, in a controlled furnace or other drawing agents, where results can be maintained to a definite uniformity. The practice of "color tempering" or "drawing" merely indicates the heat of oxidation on the surface, it is impossible to maintain uniformity by this method, and experience has taught us that the results and life of the tools that have been "color tempered" are so varying that the practice has been abandoned for the more positive technique of "controlled tempering or drawing".

Fig. 3 shows the dimensions of the fourth drawing punch. This is the final drawing operation. Therefore, the dimensions are much more closely maintained and the tolerances are less than for preceding drawing operations, and by the same token, the polishing technique must be of the very finest. Again the polishing lines must be parallel to the axis of the punch. The necessity of the four drawing punches being highly polished cannot be over-emphasized because the life of this tool is definitely proportionate to the grade and type of polishing.

Fig. 4 shows the die for the fourth drawing operation. Again the permissible tolerances are considerably reduced for the same reason as the punch. Another important phase of the manufacture of this die is that the base of the die must be at perfect right angles to the working surface of the die itself. Unless this dimension is accurately maintained, the resultant production may be very defective by virtue of a thin-sided case or the life of the die may be reduced because of extreme wear on one side or the other.

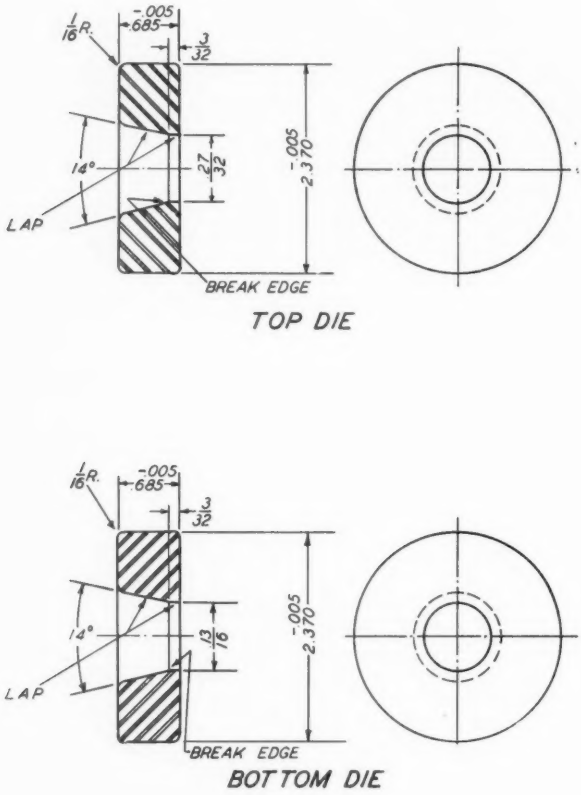


Fig. 4

Heat Treatment of Dies

All the drawing dies should be "spouted", however, care must be exercised in the design of this "spouting equipment" to insure that a baffle is provided. This is easily understood when the contour of the die is examined. We notice that the die is conical for a certain depth and then a small flat "land" of approximately $\frac{3}{32}$" is shown. It is this small land that is actually the drawing surface of the die. The taper is merely the lead.

Experience has taught us that when a liquid is spouted into a die of this shape, the taper will tend to act as a venturi, permitting the water to follow the lines of the taper. As a conse-

(Continued on Page 54)

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We have just occupied this new addition to our shop and our new offices. The added shop area and equipment will enable us to produce a greater volume of fine gage and die work.

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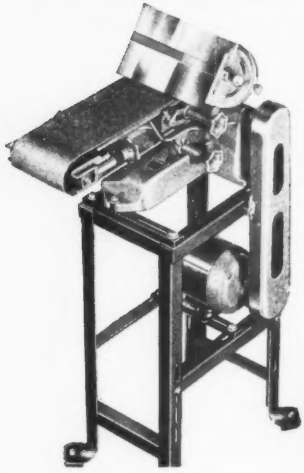

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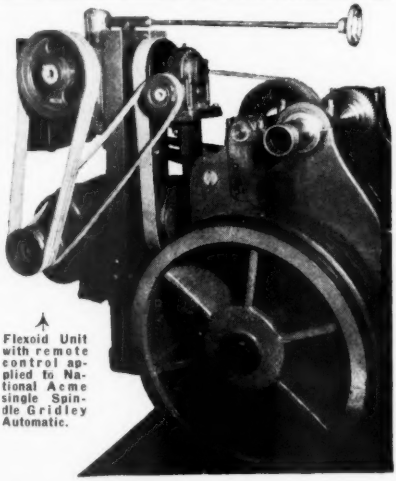

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CIRCLE©—**a *Super* High Speed Steel for severe work.**
BLUE CHIP HIGH SPEED STEEL—**for general shop use.**
STAR-MO—**A "Moly" High Speed Steel for general use.**
SPECIAL GRADES OF HIGH SPEED STEEL—**for particular requirements.**

FOR BLANKING, STAMPING AND FORMING DIES

CROMOVAN—**High Production Die Steel.**
INVARO—**"Non-shrinking" Die Steel.**
SPECIAL A. S. V.—**"Center-Free" Carbon Tool Steel.**
STERLING XX—**Cold Heading Die Steel.**
FIRTHITE SINTERED CARBIDE—**for Stamping.**
FIRTHALOY SINTERED CARBIDE—**for Drawing and Extrusion Dies; Wire Forming and Heading.**

FOR HOT WORK: FORMING—PIERCING—HEADING

XDH, XDM and XDL—**Extrusion Die Steels.**
LT and LTL—**Tungsten Hot Work Steels.**
HWD and CYW—**Chromium Hot Work Steels.**

FOR FATIGUE RESISTING TOOLS

J. S. PUNCH & CHISEL STEEL.
SPECIAL PISTON STEELS.
CHIMO AIR-HARDENING CHISEL STEEL.

FOR CORROSION RESISTANCE

STERLING STAINLESS AND NIROSTA STEELS for bearings, wear parts, etc.

FOR WEAR RESISTING PARTS AND GAUGES

FIRTHITE AND FIRTHALOY SINTERED CARBIDE.

★ ***Complete information about any of these materials available at Booth No. 9, Arena Floor, National Metal Show.***

FIRTH-STERLING
STEEL COMPANY

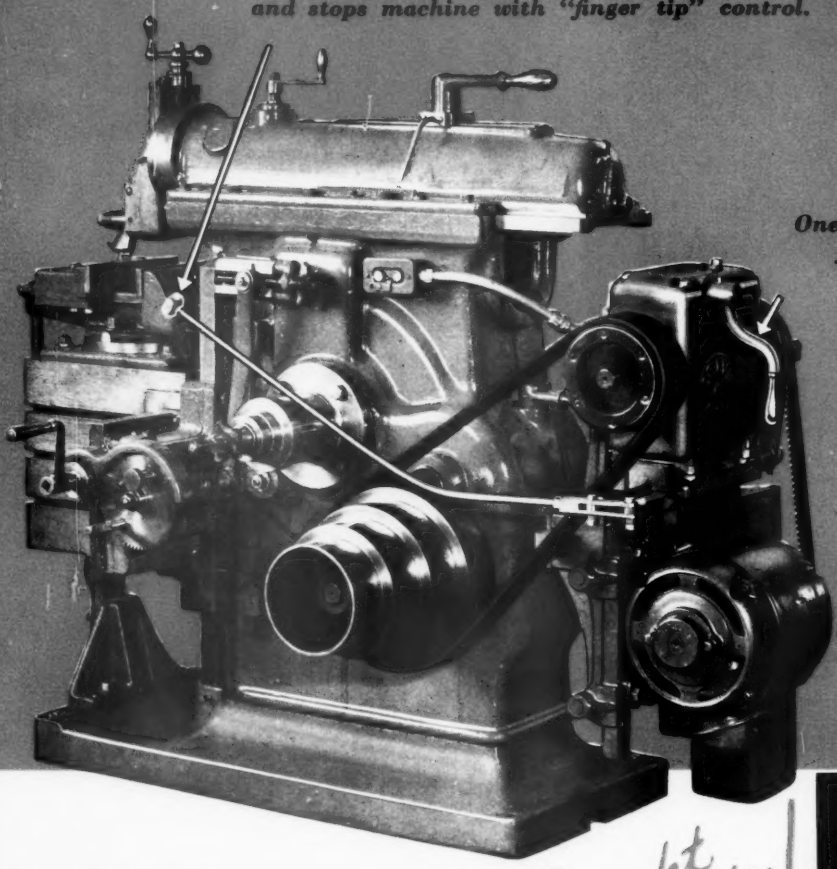
McKEESPORT, PA.

MACHINE TOOL BUILDERS AND MANUF

DRIVE-ALL

Both three and four speed units are available with either Right or Left-hand power take-off. Drive-Alls are built in two sizes for loads from 1 to 10 HP.

Shaper application — Clutch control lever starts and stops machine with "finger tip" control.



One lever contr four speeds.

In an avera of two ho belt-dri chine in can be into a m mach creas step duc

New Bulletin with specifications will be sent promptly.

Prompt Deliveries!

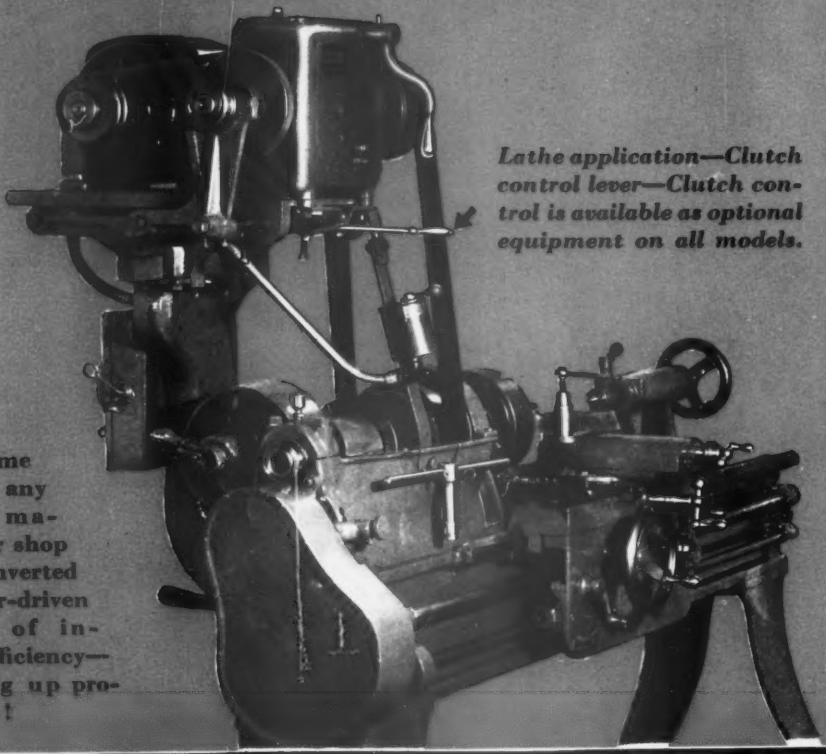
D
MA
340

NUFACTURERS OF POWER EQUIPMENT

UNITS HELP SPEED DEFENSE PRODUCTION

The versatile Drive-All Units efficiently motorize machines now belt-driven; they provide manufacturers of new machinery with a gear box to be built into equipment. They serve wherever variable speeds are essential.

er controls
speeds.



Lathe application—Clutch control lever—Clutch control is available as optional equipment on all models.

n an average time of two hours, any belt-driven machine in your shop can be converted into a motor-driven machine of increased efficiency—stepping up production!

DRIVE-ALL
MANUFACTURING COMPANY
3400 Conner Ave., Detroit. Mich.

The illustration shows a section of our Engineering Department in which special tools, jigs, fixtures and special machines are designed for unusually wide diversification of industries.

DESIGNING and BUILDING for DEFENSE

This service has been set up both for our regular customers, whose work comes into our Contract Tool and Die Shop, and for those shops and manufacturing plants that hold prime and subcontracts for Defense work. Engineering hours are available for partial or complete tooling programs.

We are now better equipped to design as well as to build precision tooling.

We invite you to consult with our engineers on your designing problems.

THE BUNELL MACHINE & TOOL COMPANY

1620 East 24th Street
ENGINEERING DEPARTMENT

PRospect 2681

Cleveland, Ohio
23rd and Payne Ave.

HI-POWER GRINDER

SPEEDS AMERICA'S PRODUCTION

For hundreds of difficult grinding jobs, nothing compares with the HI-POWER — a constant service tool that gives smooth, precision performance. Has ample power to drive a 2½" diameter wheel. 17,000 r.p.m. Wt. 3 lbs. In wood case, with accessories, $38.50.

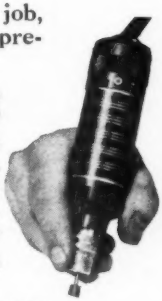
Catalog of Complete Line on Request.

CHICAGO MOUNTED WHEELS — **FIRST and FINEST**

Actually cut grinding costs ⅓ to ½. Made of V/T Super Bond, the toughest bond made—will stand up under the most exacting conditions. Hold their shape and grind more pieces per wheel faster and without sacrifice to cutting action.

TEST WHEEL

Try one free. Tell us kind of job, grinder you use and size wheel preferred.



HANDEE TOOL OF 1001 USES

The little Caesar of grinders. Also drills, polishes, cuts, routs, carves, sands, saws, sharpens, engraves, etc. De Luxe model 12 oz. 25,000 r.p.m. Fits in any A.C. or D.C. socket. With 7 accessories, $18.50.

IMMEDIATE SHIPMENT

Send for the HI-POWER or the HANDEE on 10 Days' Trial.

Chicago Wheel and Mfg. Co.

Makers of Quality Products for 40 Years

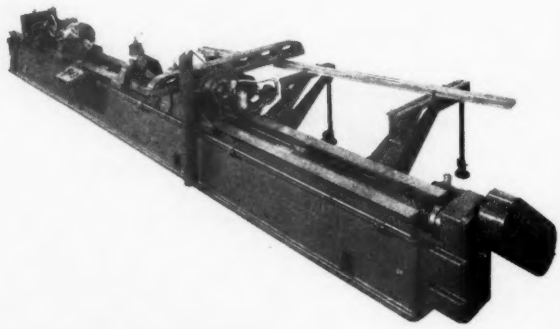
1101 W. Monroe St., Dept. TD, Chicago, Ill.

Canadian Office - 1332 William St., Montreal

Builders Iron Foundry Announces Gun Barrel Drilling and Reaming Machine

THE Builders No. 1A Gun Barrel Drilling and Reaming Machine, as illustrated, is a double spindle machine arranged for deep hole drilling from the solid. With a 40 mm x 85" capacity, this machine can also be used for either draw type or push type reaming and boring, being furnished with a wide enough range of speeds and feeds to accommodate the deep hole drilling, reaming and boring operations.

Each of the two spindles is driven from a 3 hp, 900 rpm motor located in the base below the headstock of the machine, transmitting power through V-belt and gears to roller bearing headstock which carries a four-jaw independent chuck for holding the barrel.



The barrel, secured in the four-jaw chuck, is supported in steady rests adjustable along the ways of the machine and in the barrel support and drill guide member shown at the center of the machine. The D-type deep hole drill is fastened in a chuck in the machine carriage, supported in the tool bar support adjustable along the ways, and guided into the work through a drill guide bushing in the work support member, thus assuring concentricity of the bore with the outside of the barrel.

A torque overload protective device is mounted on the carriage of the machine and can be set to trip when any predetermined torque on the drill is reached, thus protecting drills against breakage when hard spots or other drilling difficulties are encountered. The torque release operates a limit switch, stopping the motor and simultaneously releasing a clutch to disengage the leadscrew, preventing any further motion of the carriage.

Oil is pumped from an oil reservoir located in the center leg of the machine, through a magnetic type filter designed to remove small particles from the oil, through oil piping into the carriage of the machine and then through the drill shank and to the cutting edge of the drill. Two pumps located in the leg of the machine at the carriage end are each driven by a 5 hp, 1800 rpm motor direct-connected. The pump capacity is 10 gpm at 700 psi.

The machine is arranged to give six spindle speeds from 175 to 1090 rpm inclusive, and can be arranged for any specified speed desired. There are two feed ranges, one for drilling and one for reaming. The drilling range consists of eleven feeds from .0005" per revolution to .003" per revolution, inclusive. The reaming range is ten times the drilling range. However, any other multiple of the drilling speeds can readily be furnished if required.

For complete information on the No. 1A Gun Barrel Drilling and Reaming Machine, address Builders Iron Foundry, 23 Codding St., Providence, R. I.

MODEL C
MODEL B
ESCO MIJIT DRILL JIGS
for fast, accurate drilling of small parts
Their low cost, quick clamping and light weight make them indispensable for rifle parts, airplane parts, machine gun parts, gun sights and mounts, etc.
Wedge-type locking-unit locks with handle in any position as soon as bushing plate touches work.
Four models and a range of sizes are available for immediate delivery.
Write for catalog and prices.
ALSO STANDARD DRILL JIGS AND JACK LOCKS.
ESCO ENGINEERING CORP.
4855 FOURTH AVE. DETROIT, MICHIGAN
MODEL E
MODEL A

Drawing Punches and Dies

(Continued from Page 44)

quence, the land would receive little or no quenching agent and would, as a result, be somewhat soft. Thus we would have a very short life die.

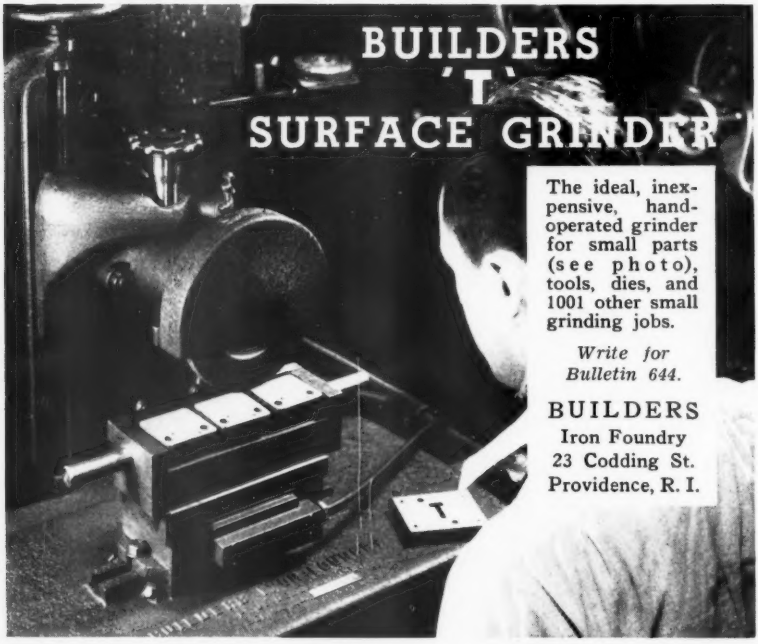
The purpose of the baffle is to force the quenching agent back so as to remove the possibility of "gas pockets" and to give a uniform quench, with resultant uniform hardness.

It is important that the outer edge of the die, that is the outside diameter, be hard, but it is important to be sure that the working surface of the die be of maximum hardness. The most desirable grain structure for the die surface would be a Martensitic, whereas the outer surface of the die could be Sorbitic.

The magnitude of the present small arms ammunition program has forced this phase of National Defense to secure production tools from diverse sources. Consequently, a very excellent cross section of the accuracy and heat treating technique can be judged when the life of these tools is taken into consideration. Therefore, it is important that the tool vendors supplying these important production tools exercise the utmost care from both accuracy and heat treating standpoints, because subsequent orders would of necessity be placed with the source that experience indicated gave the most satisfactory results.

"How Inventors Can Aid National Defense"

Information Bulletin No. 2, "How Inventors Can Aid National Defense", issued by the National Inventors Council reviews the work done by the Council in its first 6 months of operation, outlines the character of useful inventions, details the subjects with which the 12 Technical Committees are concerned and gives a suggested procedure for submitting inventions. Also included are brief biographical sketches of council members and a technical bibliography subdivided by Committee subjects. Those interested may secure a copy of Information Bulletin No. 2 by writing National Inventors Council, Department of Commerce, Washington, D. C.



How to Establish *Your Own*
LIMITED BUDGET INSPECTION LABORATORY

Your problem isn't only production. **DON'T OVERLOOK INSPECTION.** It doesn't help much to deliver when the goods are due if they are rejected because of inaccuracy and failure to meet close tolerances.

It's a simple matter to avoid these costly rejections. Install our "**LIMITED BUDGET INSPECTION LABORATORY**" in your shop and you'll eliminate all disputes regarding measurements, do away with waste in materials, money and labor and **BE SURE THAT THE WORK YOU PRODUCE** is going to meet the close limits that are specified today.

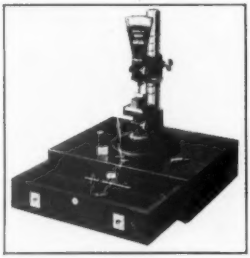


Fig. 1

Fig. 2

The Scherr **INSPECTION UNIT** (Fig. 1) consisting of Comparitol to inspect to 1/10000" and **INSPECTO-SET**, 34 gage blocks producing thousands of combinations in steps of 1/10000", is available to your shop at a reasonable price.

The Wilder Micro-Projector (Fig. 2), a highly accurate machine for measuring or comparing objects by a magnified shadow image, speeds up inspection of screw threads, gears, templates, punchings, etc.

Write today for new bulletins, showing how to establish a limited budget inspection laboratory, which explain why you should and how you can obtain an inspection department at a price within your means.

ON EXHIBIT — PHILADELPHIA, OCTOBER 20-24

The entire inspection laboratory will be on display at the NATIONAL METALS EXPOSITION in Philadelphia, October 20-24. Visit Booth A-42 and see, in addition to the Scherr Comparitol and Wilder Projector, the following:

MAGNI-RAY, the new illuminated magnifier ready to plug into your 110 volt socket. *Essential for inspection.*

REED MICROMETERS, made in Worcester, Mass., for over 30 years. *Guaranteed for accuracy.*

ULTRA-CHEX — Gage blocks for precision manufacture.

TOOLMAKER MICROSCOPE — for checking thread gages, forming tools, lead, angle and pitch diameter.

GS DIAL TEST INDICATORS — LITTLE WONDER RADIUS DRESSER — ATLANTIC SNAP GAGES — SURFACE PLATES — ANGLE IRONS — MAGNE-BLOX — KOLD-HOLD Sub-zero chillers — **NICHOLS HAND MILLER.**

GEO. SCHERR CO., 128-B Lafayette St., New York, N. Y.

Tool Making
Holds Many
Interests
Not Fully
Known!

As all files by style
And by nature file,
All our Cutters gear
To the cuts they "shear".

Their design and make grade their "Ground-tooth's" rake; and their increased speed helps results to lead. Now the very best, that is known by test, brings a smile to costs by "Deburring" loss. Severance restarts, where the old departs, for "Regrinding" rears what was scrapped for years.

So investigate what all Pasts relate; do not take our word—let the facts be heard. Engineering skill and our service still play a potent role where our Cutters stroll. As our work expands to meet all demands, we can say to you that delays are few.

To users of Rotary Files:

"There is no shortage in the Midget Milling Cutter Field of standard shapes and sizes".

SEVERANCE
TOOL COMPANY

1506 East Genesee Avenue
Saginaw, Michigan

MANUFACTURERS of Midget Milling Cutters, "Ground from the Solid after Hardening"—"Chatterless" Countersinks—Tube Deburring Cutters—and Special Tools. Also, "Regrinding Service" which enables the average Midget Milling Cutter to do the work of ten ordinary Rotary Files. Users and Prospects on the Pacific Coast may address our Western Branch at 3844 South Santa Fe Avenue, Los Angeles, California.

REGRINDING CONSERVES STEEL

Recommended Procedure for Sub-Contractors

THE procedure for the Contract Tool, Die or Mold Shop, departments of production plants with facilities for precision work and the small manufacturer seeking Defense work is to go to the nearest Contract Distribution Division Office (see list of present offices on page 40) with full information as to your plant's equipment. The objective of these offices is to get Defense production work spread out among the small plants of the country. Accordingly, the entire facilities of the Washington headquarters and of the field offices are setup to help the small business man get Defense work from the Government, or as the case may be, from an existing prime contractor.

Many metal working plants have been surveyed by District Procurement Offices of Departments of the Army and of the Navy. The fact that no survey has been made of your plant, department or shop should not keep you from contacting the Contract Distribution Division Office nearest you. These offices are equipped to furnish full information to enable you to definitely determine exactly which work you are equipped to do.

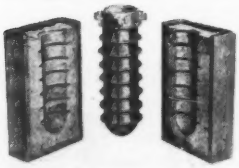
Floyd B. Odlum, Director of Contract Distribution Division, OPM, states that additional offices will be opened in other industrial areas as fast as the necessary manpower can be organized. The present number of field offices will be more than doubled. The field offices will be organized along state lines, with at least one office in every state and one office designated as the main state office in states in which more than one office will be operated. The work of the Division will be decentralized to the fullest degree possible and offices are and will be staffed with men well qualified to help small business men get Defense contracts.

Mr. Odlum has asked 56 of the companies holding major prime contracts to appoint an executive in charge of subcontracting. Intensive study will be given the problem of wider and more efficient sub-contracting to speed Defense production. The problem of "priorities unemployment" will get quick action. Defense production clinics, with practical exhibits, already proven successful, will be continued.

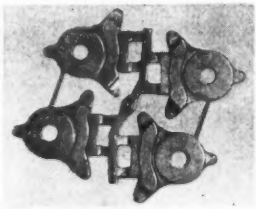
DIES · CHUCKS · PATTERNS · TUBE BENDS

..make them faster and better with

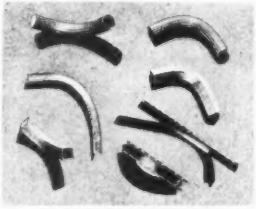
Perforating Die with Punches secured by CERROMATRIX



Chuck Jaws made of Cerromatrix.



Reproduction of Master Pattern made with Cerrobase.



Typical Tube Bends made with Cerrobend.

CERRO ALLOYS have helped many progressive metal-working plants keep abreast of National Defense demands. Although these non-shrinking, low-temperature-melting alloys are furnished in practically any analysis required, the three most widely used are described below:

CERROMATRIX — for securing punch and die parts, making chucks for holding irregular parts, anchoring machine parts without necessity of drive fit, and many other uses.

CERROBASE — For reproducing master patterns, models for electroforming, proof casting for forging dies, etc.

CERROBEND — Used as a filler in bending thin-walled tubes to small radii — easily removed in boiling water.

Send for literature, mentioning operation in which you are interested.

CERRO DE PASCO COPPER CORPORATION
40 WALL STREET - - NEW YORK, N. Y.
BRITISH ASSOCIATES: MINING & CHEMICAL PRODUCTS LTD., LONDON • CANADIAN DISTRIBUTORS: DOMINION MERCHANTS LTD., MONTREAL

Dies
Jigs
Gages
Fixtures
Aircraft Parts
Special Machines

STAR MACHINE & TOOL CO.

9320 WOODLAND AVE. CLEVELAND, OHIO

Detroit Representative:

J. O. Stephenson 2867 E. Grand Blvd. Detroit, Mich.

Complete Manufacturing Facilities

Over 50,000 Square Feet of Floor Space

TOOLS, DIES GAGES JIGS, FIXTURES
SPECIAL MACHINERY METAL SPECIALTIES
JIG BORING DESIGN AND DEVELOPMENT

Punch Presses
Kingsbury Drilling Machines
High Speed Tapping Machines
Multislide

Injection Moulding
Spring Winders
High Speed Blanking
Spot Welders
Conveyors

Send prints or sample for prompt estimate

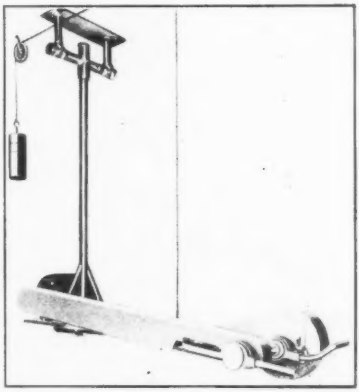
FEDERAL TOOL CORPORATION

400 North Leavitt Street - - - - Chicago, Illinois

Jefferson Offers Improved Swing Frame Grinder

JEFFERSON Machine Tool Co., Cincinnati, O., announce their new improved No. 101 Swing Frame Grinder and Polishing Machine, designed to grind, polish or buff castings, sheets, tubes, bars, etc., too large or too unwieldy to work to with standard floor lathes. Using wheels up to 14" diameter the Jefferson Swing Grinder is fully universal—it can be swung forward and backward, up and down, right and left and at any degree of angle or twist at the spindle head.

The weight of the motor and the counter-balancing cable and weights make operation of the machine very convenient and easy. One operator can do the work ordinarily requiring two men and without tiring. The Swing Frame is usually swung about three feet from the floor and is especially adapted for work which cannot be lifted to or conveniently set up for a mounted wheel.



Polishing head spindle of high carbon steel is 1¾" diameter running 2100 rpm in precision ball bearings. Double V-Belt Drive is provided through 6" diameter pulley. Tension of belts remain constant in any position or angle of machine. An adjusting head screw is provided for taking up stretch in belts. Heavy guards at V-Belts are designed to allow for universal movements. The No. 101 Swing Grinder is sold complete with cable, pulleys, counter-weights,

(Continued on next page)

ACCURACY TO THE Nth DEGREE

JOHANSSON Gage Blocks approximate the absolute in accurate measurement.

The closest possible tolerances are obtainable with Johansson Gage checking. They are indispensable in the "all out" production programs of the present emergency.

With accuracy that is unsurpassed, it is small wonder they are accepted as the world's standard of precision measurement.

FORD MOTOR COMPANY
Johansson Division
(Dept. H) Dearborn, Michigan

JOHANSSON GAGE BLOCKS

DARWIN STEELS

Stand for Quality

We were the Originators of HIGH CARBON-HIGH CHROME Steels with NON-DEFORMING Qualities, opening the way to

Quantity Production

with all kinds of Dies and Press Tools

Oil-Hardening
"NEOR"

Air-Hardening
"COBALTCROM-PRK"
—the latter also in CAST FORM

have become the STANDARD on which all subsequent similar kinds of Steel were based.

We supply also

High Speed Steels

in Bars, Forgings, Tool-Bits as well as all types of

High Grade Tool Steels

Write for descriptive Circulars

WELDING RODS
Save time and money in die repair or tool redesigning as used in Precision-Welding.

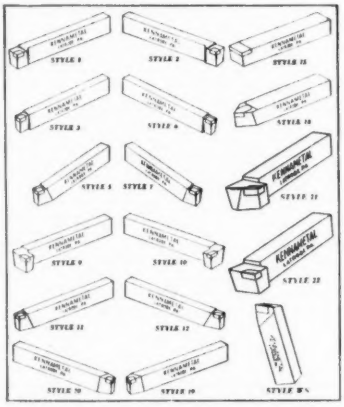
Full particulars on request

DARWIN & MILNER, Inc.

1260-64 W. 4th St. Cleveland, O.

McKenna Metals Co. Issues Weekly Stock Sheet

IN order that their customers will know the various standard styles of Kennametal carbide tipped tools that are available in stock, the McKenna Metals Company, 500 Lloyd Ave., Latrobe, Pa., are issuing a weekly stock sheet as shown in the illustration.



When orders are received on the tools which are carried in stock, they are shipped immediately or, in the case of unusually large orders, partial shipments are made. The company also states that when standard Kennametal tools are not available in stock, they will be made up and shipped within 48 hours and when there are small variations from standard designs, the orders will be filled within a week or ten days.

This service will undoubtedly aid purchasers and users of carbide tipped tools when they are ordering and will speed the delivery of necessary cutting tools in the Defense Program.

The weekly stock sheet will be sent on request. Write McKenna Metals Co., 500 Lloyd Ave., Latrobe, Pa.

Jefferson Swing Frame Grinder

(Continued from Page 59)

motor, safety guards and exhaust outlet.

The company also makes special machines to meet special requirements.

For an illustrated circular on the Jefferson No. 101 Swing Frame Grinding & Polishing Machine write Jefferson Machine Tool Co., 710 N W Fourth St., Cincinnati, O.

Another "Hit" for Defense Production

the Jackson No. 1 Horizontal

MILLING MACHINE

The new Jackson No. 1 Horizontal Milling Machine is designed for tool room, experimental and production work that can be most efficiently and economically done by a small precision unit.

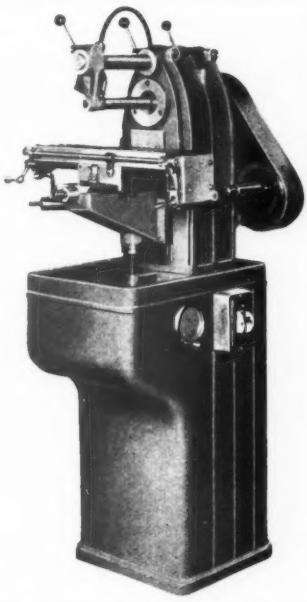
The new mill—quality built of high grade materials—will handle 3/8" cut, 3/4" deep in solid steel at one cut. Cutter capacity 1/2".

Production in our new enlarged plant permits best possible deliveries.

Full specifications sent promptly.

Wire, Phone or Write

Jackson Machine & Tool Company Sales Division
956 Roberts St. Jackson, Michigan



David J. Ross Co. Appoints Wright

THE appointment of Oral B. Wright as Director of Sales and Advertising for the David J. Ross Co., Benton Harbor, Mich., manufacturers of punch presses and production equipment, was recently announced. He has already assumed his new position in charge of sales and advertising.

Wright served with Dodge Motor Co. in 1914 when the first Dodge automobile was produced, and for a number of years following. He also has had wide experience in other machinery and automotive sales fields.

McKenna Opens Central New York

B. E. MIDDLETON has been appointed representative in the Central New York territory, with headquarters at 217 East Ave., Rochester, N. Y., for McKenna Metals Company, 500 Lloyd Ave., Latrobe, Pa., manufacturers of Kennametal steel-cutting carbide tools and blanks.

New DUPLEX Die and Punch Filing Machine

the exclusive double-purpose tool with adjustable stroke from 0 to 1 1/2". This machine files dies in the conventional way on *upper* table (see picture at left), and punches with heels, flanges or *blind holes* on *lower* table from above (see picture at right), by tilting upper table out of way.

See it at the Metal Show
Booth 262

MARBURG BROS., INC.
88-92 West St. New York

a Contract Shop—Well Equipped to

Design and Build Tools and Dies

Facilities available for producing Special Machine Parts

MAY WE HAVE THE OPPORTUNITY TO SERVE YOU?

Call MAin 3200

HASERODT MACHINE & TOOL INC.

1824 Columbus Road **Cleveland, O.**

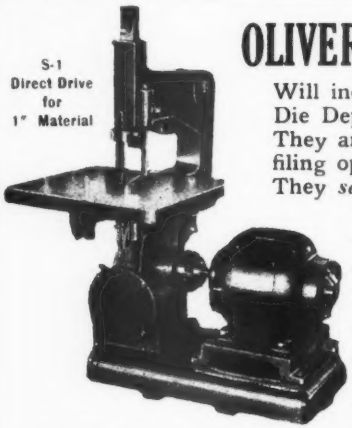
Detroit Broach in New Plant

THE Detroit Broach Company, manufacturers of broaches and broaching fixtures, have moved into their new plant on Sherwood Ave. near Eight Mile Rd., Detroit, Mich. Gustav von Reis, president, states that the plant has tripled its former floor area, providing greatly increased production facilities as well as unexcelled working conditions for an enlarged engineering department and general office staff.

Plastics Parts for Refrigerators

IN a survey made by the Plastics Department of the Du Pont Company, engineers of the larger refrigerator manufacturers predict that electric refrigerators in 1942 will have more than 50 plastics parts. A composite 1941 electric refrigerator has some 39 plastics parts and more than 77 possible plastics applications. Twenty-six of the 39 plastics parts are of thermoplastic materials; the other 13 of thermosetting materials.

OLIVER DIE MAKING MACHINES



Automatic Drill Grinders, Tool and Cutter Grinders, Face Mill Grinders, Template Tool Bit Grinders.

Will increase the efficiency of your Tool and Die Departments.

They are fast and efficient on all sawing and filing operations.

They *save* 50 to 60% of the labor over hand methods.

Available in nine styles.

CONSERVE your high speed cutting tools by increasing tool life.

STOP wasteful Hand Grinding.

INVESTIGATE the Oliver line of Tool Reconditioning Machines; get the most out of your Cutting Tools through increased output between grinds and less wastage in the Grinding Operation.

SEND FOR LITERATURE

OLIVER INSTRUMENT CO. **1436 Maumee Street, East, Adrian, Michigan**

Ohio Tool Leads in Small Arms Ammunition Tool Building

THE Ohio Tool Company, Cleveland, O., has become, in less than one year, the largest manufacturer of small arms ammunition tools in addition to its output as designers and builders of dies, jigs, fixtures, gages and special machinery. Since last December 15, when the first cal. .30 drawing die was made, this company has built and shipped close to half a million perishable tools required for small arms ammunition manufacture.

The company has expanded tremendously in the past two years—the volume of business now being at a rate of more than 50 times that of 1939. Ohio Tool now occupies two modern plants, both of which are full daylight construction and fluorescent lighted. Over 600 persons are now employed. Constantly controlled temperature is maintained throughout. All machinery is of modern design with individual drive.

The close tolerances required on small arms dies, tools and gages and the large quantities involved have made improved types of gaging equipment necessary. One testing machine used for inspection, for example, is a projector capable of magnifying an object 1" square to 62½ times without movement.

The company maintains a special staff for training new employees. Two full 58-hour shifts keep the number of vitally important dies, tools and gages for British as well as for American ammunition plants steadily mounting. The record being made by this company is one of the outstanding examples of the ability of American Industry to increase its capacity for Defense production.

Record Made With Graphitic Steel Die

A Timken Graphitic Steel die, quenched at 1200 F and hardened to 60 R. C., used by a toy train manufacturer, recently produced its six-millionth piece. This die is a 5-stage, progressive die which pierces, notches, pierces a second time, embosses, forms and cuts off. Rejects are less than 1/10 of 1 per cent. A Graphitic Steel ram, used on a single die casting machine, operating at 150 casts per hour, achieved a record of 105,000 pieces. Steels used previously produced a maximum of 18,000 pieces before being discarded.

File Figures *that every file user should know*

This is the average estimate of the greater life of "American Swiss" Swiss-Pattern Files compared to others, as reported in an impartial survey made among file users.

▼

These files are made of file steel (not tool steel), are accurately cut, have more filing surface, and are made in a single quality—the best.

Buy from our Distributor

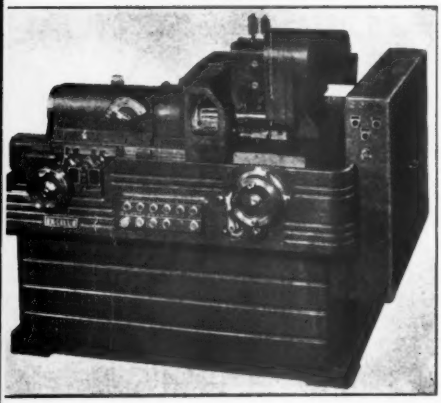
ONLY THE BEST

American Swiss File & Tool Co.
ELIZABETH, N. J.

AMERICAN SWISS PATTERN FILES

An all-purpose mitering attachment which performs three operations with a single unit has been developed by Continental Machines, Inc., 1303 S. Washington Ave., Minneapolis, Minn. Notching, squaring, ripping and mitering of all types of regular and irregular shapes is possible. The unit is attached to the front of the work table and a removable guard provides adequate protection.

PROGRESS



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An automatic thread grinder for internal grinding, known as Style 39A, is being manufactured by the Ex-Cell-O Corporation, 1202 Oakman Blvd., Detroit, Mich. Threads up to 5" in length in holes from 1" to 9½" can be ground. A taper attachment allows grinding to a maximum of 4" in diameter per foot on the effective threading length. A new catalog on this and seven other standard thread grinders is available on request.

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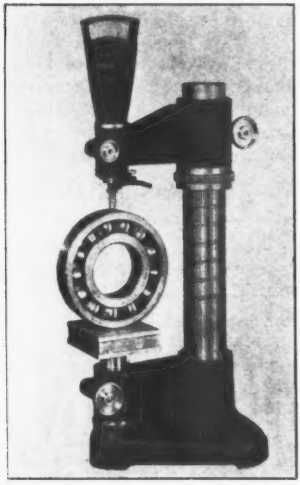
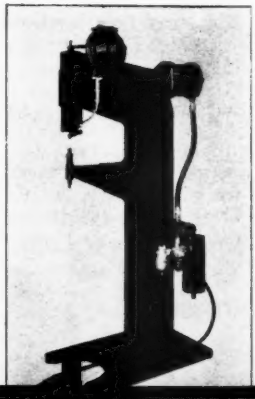


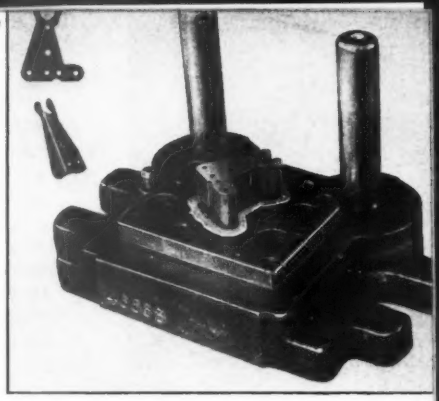
The new Heavy Duty Model 8 Comparitol made by George Scherr Co., 128-B Lafayette St., New York, N. Y., is shown at left measuring a bearing 6" in diameter to an accuracy of .0001". This unit has been designed for large and heavy precision work up to 8" in diameter. The unit is effectively used to inspect gages, bearings, pins and similar parts. Vibration does not affect the accuracy of this new model, making it extra useful where it is impossible to use standard inspection instruments.

•

The Tomkins Johnson Co., 630 N. Mechanic St., Jackson, Mich., announce the development of a new type rivet setting machine, combining an "air squeezing" action with an automatic feed. Pressure is furnished by a 6" diameter air cylinder using a pressure of 60 psi.



SS on PARADE



Seven hours were saved in the construction of this die built by Ranco, Inc., for the blanking of .043 stainless steel. This was possible by the use of Cerromatrix. This method eliminates complicated holding devices. Cerromatrix is a product of the Cerro de Pasco Copper Corp., 44 Wall St., New York, N. Y. A number of interesting applications are illustrated in a manual recently published by this Company. The die set illustrated is back post regular type manufactured by Danly Machine Specialties, Inc., 2100 S. 52nd Ave., Chicago, Ill.

Lowering plates into a new annealing furnace recently installed in the Chicago plant of Joseph T. Ryerson & Son, Inc., Chicago, Ill., is shown in the illustration. This furnace measures 24 ft. and is for the purpose of annealing stock steel products, to improve machinability, or to change metal structure. This addition adds to the service facilities of this steel service plant. The furnace can be divided into three sections, making possible an exceptionally prompt annealing service. This company recently issued a new catalog which is available on request.

•

Atlas Press Co., 912 N. Pitcher St., Kalamazoo, Mich., have introduced a new series of two, three and four-spindle drilling machines. The drilling heads on these machines incorporate ball bearing floating drives. Each drilling head is equipped with its own motor mounting and a new type of positioning control. The work table of these new drills furnishes a solid support for the smooth movement of heavy jigs, fixtures and production parts. A descriptive Bulletin will be sent on request.

•

The series "S" 10" Tool Room Bench Lathe manufactured by South Bend Lathe Works, 802 S. Madison St., South Bend, Ind., is particularly recommended for precision operation on small work. Four sizes provide center distances of 16⅜", 21⅜", 27⅜" and 34⅜". Mounted on a tubular steel bench, this lathe has the rigidity of a floor type model combined with the speed and space saving advantages of a bench lathe.

PROGRESS on

•

The No. 2 Cutter and Tool Grinder built by Norton Company of Worcester, Mass., incorporates a number of unique features. Operation is possible from the front or back of the machine; ball bearing table movement eliminates friction; universal work head is supplied with collets for Standard, B&S and Morse tapers. Attachments are available for internal, surface, cylindrical and gear cutter grinding.

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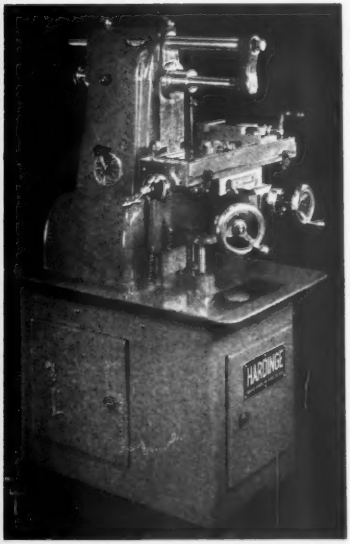
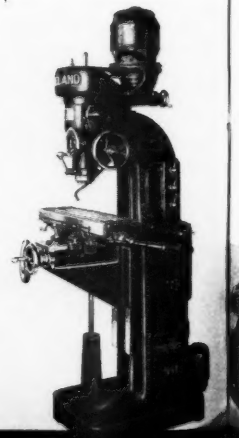


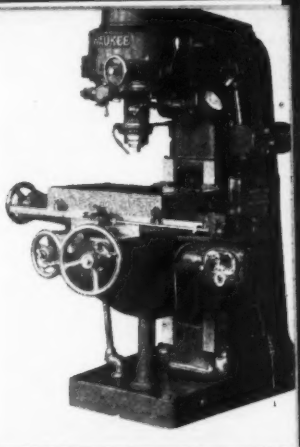
This High Speed Precision Milling Machine was developed by Hardinge Bros., Elmira, N. Y., to meet a demand from tool rooms and die shops for a proper size machine to do exact milling operations on small work. New Bulletin gives complete details.

•

The Cleveland No. 1 High Speed Vertical Spindle Milling Machine is built by The Sommer & Adams Co., 18511 Euclid Ave., Cleveland, O. While it has been designed particularly for tool rooms and die shops the mill is capable of high production work. A new circular giving complete specifications and details of design features is available.



SS on PARADE



With the Rotary Head Tool and Die Milling Machine built by the Kearney & Trecker Corporation, Milwaukee, Wis., layout work, milling, drilling, boring and slotting operations are possible with one setup. The rotary head may be compared to an inverted rotary table with a spindle mounted so that it can be set off center radially and rotated in a planetary motion. The head may be revolved through 360° either by hand or power. Descriptive folder is available upon request.

•

The new Gorton Munitions Engraver offered by George Gorton Machine Co., 1319 Racine St., Racine, Wis., is designed to speed Defense production. By eliminating many of the levers, controls and attachments found on standard engravers, this model can be produced three times as fast. A simplified spindle drive and semi-fixed table assembly are two of the principal features. A flat work Cutter Head is standard equipment, a double-purpose Cutter Head is available. Complete specifications and illustrations of work done are included in a new Bulletin.

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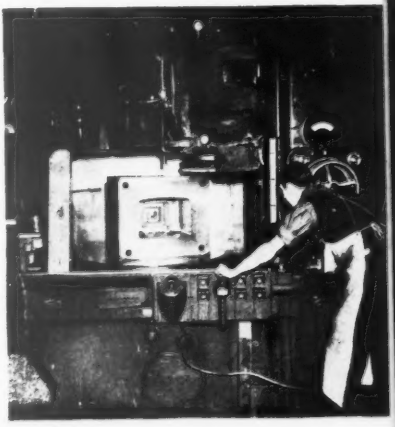
The Blanchard Machine Co., 64 State St., Cambridge, Mass., build an essential tool room machine—the No. 18 Blanchard Surface Grinder shown grinding a radio cabinet mold, removing $\frac{1}{16}$" stock on all outer surfaces. This machine is versatile—it is well adapted to machining from the rough as well as producing very fine finishes to close tolerances.



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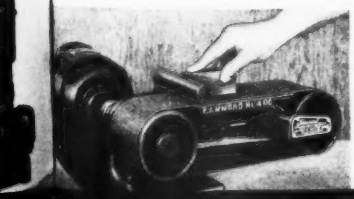
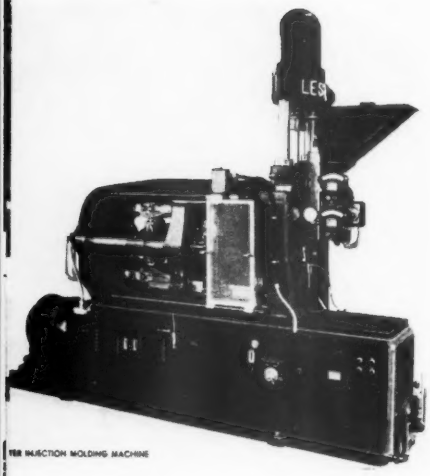
A new Bench Type Belt Surfacer for wet or dry surfacing operations is announced by Hammond Machinery Builders, Inc., 1631 Douglas Ave., Kalamazoo, Mich. Known as Model "400", it is capable of producing successful finishes on steel, aluminum, ceramics, plastics and other materials. The unit is sturdily built and practical for many uses. Descriptive Bulletin GP2 will be sent on request.





2B INJECTION MOLDING MACHINE

"Cylinder Interchangeability"

Gaining Flexibility in Injection Molding by the use of Interchangeable Heating Cylinders.

By Jack Geers
Index Machinery Corporation

IT has often been stated that no two injection jobs present the same problem to the manufacturer. Differences in the flow characteristics of the materials, varying requirements of the finished article etc., all tend to make the manufacture of each item a problem in itself.

Articles consisting of a heavy cross-section and taking a large volume of material may require a rather low pressure per square inch on the material and a high displacement of material in the heating cylinder. On the other hand, some articles having a relatively thin cross-section and many core pins, require a high pressure on the material in the heating cylinder and a small displacement in order to eliminate weld marks in the finished article.

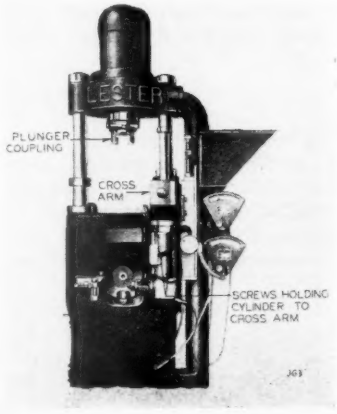
Recognizing these variables, the Lester Engineering Company has designed its line of Lester Fully Automatic injection molding machines so that these conditions may be easily met at a minimum of expense and inconvenience to the manufacturer.

This flexibility in operation is accomplished in the design of the Lester Machine by providing an easy and simple exchange of heating cylinders. For jobs requiring a large volume of material at low pressure a large capacity heating cylinder is used.

When a job is encountered, requiring a smaller volume of material and a higher pressure, a smaller capacity heating cylinder with a corresponding smaller area of the injection plunger is employed. Since the basic features of the machine, namely the total pressure of the injection piston and the stroke of the injection piston, remain the same, the pressure per square inch on the material is increased and the volume of material delivered per stroke is decreased.

There are three standard sizes of heating cylinders available for every model of Lester Machine. For example, the Lester Model No. 2B-44-6 can be equipped with a 6 ounce cylinder giving a pressure of 20,000 psi on the material, a 4.3 ounce cylinder giving 28,000 psi on

(Continued on Page 74)



Reduce Wear and Breakage of Tools

NoSep Lubricant is proving its worth these days in leading plants—particularly where hardened and toughened steels are being tapped, drilled, bored, broached, pierced, threaded, etc.

NoSep has unusual lubricating and heat absorbing properties—it tends to glaze the tools and greatly increase their life.

Ready to be used as is or slightly diluted with inexpensive lubricating oils.

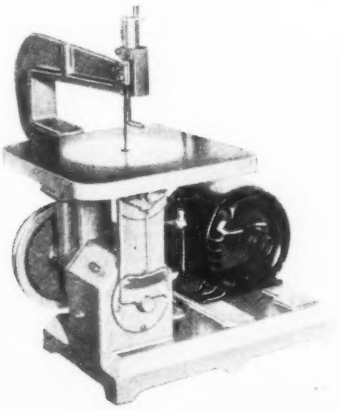
3B Lubricant is NoSep in base form,—to be diluted with from 1 to 8 parts of light mineral lubricating oil for many jobs. It is widely used for the most difficult jobs on steel where the lubricant may be brushed on.

WRITE FOR FURTHER INFORMATION AND/OR WORKING SAMPLES.

WAYNE CHEMICAL PRODUCTS COMPANY

9425 COPELAND ST. *Established 1898* DETROIT, MICHIGAN

WHY WAIT? NEW ATLAS DIE-FILING MACHINES AVAILABLE FOR IMMEDIATE DELIVERY



Can be used for all kinds of die making. The overarm is constructed so that the file and saw attachments may be interchanged with little effort. The holddown fingers are attached directly to the overarm. Working surface of the table, which tilts two directions, is entirely clear. An improved type of chuck, consisting of movable hardened jaws, holds both saws and files. Screw adjustment makes changes easy and fast. The ATLAS Die-Filing Machine has every possible advantage for rapid and accurate diemaking — AT A BIG SAVING OF LABOR.

Price, complete with motor — **$125.00 Net**

F.O.B. CHICAGO

ATLAS EQUIPMENT COMPANY

101 S. Clinton St., Chicago, Ill.

Model E Empco Unit Offers Many New Features

ENTIRELY new, the Model E Empco Unit incorporates many new features to increase the adaptability and capacity of these versatile tools. The spindle quill and return cylinder rod have been hardened—providing two hardened, replaceable surfaces to control the reciprocating movements of the tool.

The plate or snail type cam has been retained since any cam can be quickly and economically produced on a metal band saw when changing from one job to another. Blank cams are carried in stock. A screw adjusting type sub-base is provided to give micrometer adjustment to the outward position of the tool.

Motor brackets can accommodate any standard NEMA frame, mounted at the rear or above the Unit. Oil seals have been provided at every opening to prevent entrance of dirt and to permit the entire mechanism to work in a bath of oil.

The front face of the Unit is keyed and tapped to accept lead screw brackets for tapping, drill guide bushing supports and outboard spindle bearings. The planed top surface of the Unit will accept all overarm supports for milling operations. A machined pad on the side permits the attachment of interlocking devices or index table drives. A large flange, accurately drilled, has been provided to accept multiple spindle heads or milling attachments.

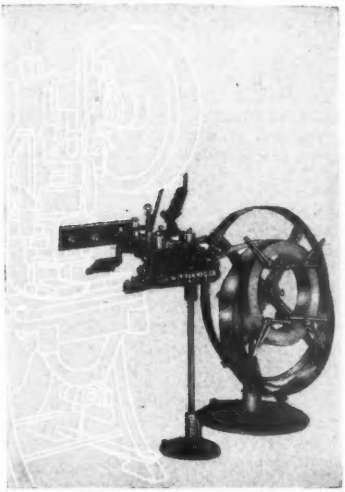
The spindle may rotate in either direction. Reversing motor drive provides for lead screw controlled tapping. Four spindle speeds can be obtained by a geared transmission. The Units will do planetary type thread milling or similar work. Special or standard milling attachments are available for any size Unit.

The illustration shows a No. 5 size Model E Empco Unit, mounted vertically and operating multiple spindle heads.

New sizes have been added, increasing the capacity of the Units. Model E is available in four sizes.

New Physical Dimension Charts covering all sizes of Model E Empco Units will be mailed on request. For specific recommendation, send print, sketch or details. Address Enterprise Machine Parts Corp., 2731 Jerome Ave., Detroit, Mich.

WITTEK *Automatic* ROLL FEEDS AND REEL STANDS



★ FOR ANY MAKE OR SIZE PUNCH PRESS

Wittek Automatic Roll Feeds provide an improved and simplified method of punch press operation that insures rapid feeding under all conditions. Wittek Roll Feeds handle any type of coiled strip stock and are made in single roll, double roll, and compound types with straighteners, in models to feed in any of four directions.

Wittek Adjustable Reel Stands provide automatically expanding coil holders that center the coil and assure maximum production by eliminating looping, tangling and backlash of stock.

If your production problem involves feeding coiled stock to punch presses, it may be solved by consulting us. Your inquiry will be given immediate attention. Send for complete descriptive catalog.

WITTEK MANUFACTURING CO.
4305 W. 24TH PL., CHICAGO, ILLINOIS, U.S.A.

Increases up to 300% *in Tool Life!*

"ADVANCED" CUTTING FLUID

Actual shop tests have shown that the use of "Advanced" Cutting Fluid has increased tool life 250% when drilling nickel steels; 400% when turning 3240 at 300 B.H., 330% when milling strong chrome nickel steel; 300% when broaching (replacing white lead and oil); and 210% when used in an automatic (replacing paraffin oil and cutting oil base). The machined finish has the appearance of a semi-finish grind.

To an improved cutting fluid, developed as a chemical combination, an improved manufacturing method permits the inclusion of water soluable elements which provide increased emulsification, stability and lubrication.

"Advanced" Cutting Fluid is economical for all types of metal cutting —it allows greater cutting speed or provides a longer tool life when used as a coolant or lubricating compound. It will heat up less than a cutting oil. The savings will be similar to those derived by the application of cemented carbide tools as compared to high speed steel tools.

A trial order will convince you. Specify your specific cutting problem so that full directions may be furnished.

ADVANCED CUTTING FLUID COMPANY

1620 Porter St. **Detroit, Mich.**

Recent Industry Publications

JACKSON MILLERS—Two data sheets, one on the Jackson No. 1 High Speed Horizontal Milling Machine and one on the Jackson No. 2 Vertical Milling Machine have been issued by the Jackson Machine & Tool Co., Sales Div., 956 Roberts St., Jakkson, Mich. Copies of either or both sheets will be sent promptly on request.

BETHLEHEM H. M. HIGH SPEED TOOL STEEL—The new booklet gives complete data on the new H. M. High Speed Tool Steel—developed as a replacement for high tungsten 18-4-1 steel. Physical characteristics and complete treatment—all the details necessary to handle this steel successfully—are given. For your copy of H.M. High Speed Tool Steel, write Bethlehem Steel Co., Dept. TD, Bethlehem, Pa.

CROSS FLOW TEMPERING OVENS—A Bulletin of Lydon Brothers, describes and illustrates the line of cross flow electric tempering ovens, direct and indirect gas ovens, dryers, kettles and other finishing, tempering and drying equipment. The line includes a double hearth oven for tempering dies. For a copy of this Bulletin write Lydon Brothers, 231 Colden St., Jersey City, N. J.

MILFORD PROFILE SAWS AND HACK SAW BLADES—are the subject of two folders issued by The Henry G. Thompson & Son Co., New Haven, Conn., Form Ps, "Milford Profile Saw", gives list prices and stock numbers. Recommended specifications for ferrous metals, nonferrous metals and plastics and non-metallics are given in table form. Form No. FR 401, "Milford Flexible Rezistors", describes and gives list prices on hand frame sizes, extra heavy power sizes and power machine sizes. Interesting photographs show the Milford high speed hack saw blades in use. Either or both of these folders will be sent on requests made to the company.

GERSTNER TOOL CASES AND CHESTS are designed and built by H. Gerstner & Sons, 56 Columbia St., Dayton, O., for tool makers, machinists and pattern makers. Catalog No. 41 illustrates and gives specifications and prices for each of five tool cases and chests. Catalog No. 41 will be sent at your request.

"BETTER GRINDING IN YOUR TOOL ROOM"—This attractively laid out booklet, written and illustrated in "man-in-the-shop" language, and pictures, describes the Cincinnati 12" Hydraulic Universal Grinding Machine. It explains the 4 advantages of extreme accuracy, faster grinding, lower maintenance and built-in skill which can be achieved. The important features of the machine are discussed and diagrammed. For your copy of "Better Grinding in Your Tool Room", address The Cincinnati Milling Machine Co., Cincinnati, O.

JESSOP MAGIC CHISEL STEEL—Bulletin 641 describes this silicon-molybdenum bearing cold work steel, which is for use where extreme toughness and resistance to fatigue are essential requirements. The heat treatment of this steel is discussed. Hardenability and Physical Properties Charts are included. For your copy of Bulletin 641, address Jessop Steel Co., 610 Green St., Washington, Pa.

STORIES OF ENTERPRISE, published monthly by the Enterprise Machine Parts Corp., 2731 Jerome Ave., Detroit, Mich., manufacturers of Empco Honing Machines. The September issue of this interesting house organ outlines the development of the Empco Unit mechanisms. Copies are now available.

DE-STA-CO TOGGLE CLAMPS—Bulletin No. 41 describes and illustrates by photographs and diagrams many of their clamps—from the light weight clamp to the heaviest clamp—including their No. 200 aircraft-featherweight. Photographs showing the De-Sta-Co clamps in actual use will prove of interest. For your copy of Bulletin No. 41 address Detroit Stamping Co., 341 Midland Ave., Detroit, Mich.

DANNEMAN STYLE "X" DIE SET BULLETIN—A new Bulletin by the F. C. Danneman Co., 203 Lafayette St., New York, N. Y., is profusely illustrated with diagrams of Danneman Die Sets and Punch Holders. The Style "X" Die Sets are made in ten punch and die areas beginning with 2" round and 2½" square up to and including 4½" x 5½", and are equipped with hardened, ground and lapped bushings and hardened and ground steel pins. A copy of this new Bulletin will be sent by the Danneman Co. at your request.

DIE-CO ACCESSORIES FOR TOOL AND DIE MAKERS—The new Catalog DC issued by Die Supply Company, Cleveland, O., is designed to aid in the selection of Die-Co springs according to the service required of them. From three complete lines of springs the die designer may select the spring best suited for a specific job. Charts give the complete lists of sizes and data pertaining to load and deflection. A separate Discount Sheet is included. Catalog DC and Discount Sheet will be sent by Die Supply Co., 1390 E. 30th St., Cleveland, O.

"CHS CARBURIZING BATHS"—The definitions of CHS Carburizing Baths—CHS No. 10, CHS No. 30 and CHS No. 70—are all treated in a new booklet entitled "CHS Carburizing Baths". Melting points and operating ranges of each bath are also given. Reasons why CHS Carburizing Baths should be used and many valuable suggestions for their use help make the new booklet valuable. Your copy of this illuminating booklet will be sent at your request. Write The Case Hardening Service Co., 2279 Scranton Rd., Cleveland, O.

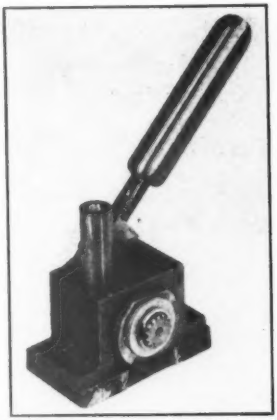
SMIT DIAMOND WHEELS AND HONES—In a new 24-page and cover 1941 Price List, issued by J. K. Smit and Sons, Inc., 157 Chambers St., New York, on their diamond wheels and hones, a useful and comprehensive system of wheel markings has been adopted. Serial numbers identify each wheel completely as to dimensions, type, depth of diamond section and concentration. In order to facilitate ordering and correspondence about wheels that are not standard a new method of designating types or shapes has been used. Specifications and prices for their fast cutting peripheral, solid, dish, flaring cup, plain cup diamond wheels and hones are given. Send for your copy of the 1941 Price List.

Esco Adds New Jack Lock

THE new Esco Jack Lock, illustrated, is the newest clamp in the line of drill jigs and clamping units made by the Esco Engineering Corporation. The new Jack Lock employs a lever or knob-operated plunger threaded on its end: it takes heads of various designs to hold work on a machine table or in a fixture.

The assembly utilizes a cast iron base 3⅛" x 1¾". The lock and other parts are made of steel. The plunger which has a 1" maximum movement, stands 2⅛" above the base in a retracted position. The jack lock has numerous applications in tool rooms and die shops. The standard unit is made in one size, but special sizes are built to order.

The latest Esco and Mijit Drill Jig Catalog is a manual of specifications and application suggestions. Adapter designs for the tool designer, a set of Mijit Jig Drafting Templates (full size on separate sheets, in a pocket of the catalog) and reference charts make the catalog particularly useful. A price list, including parts, is included.



Complete information on the new Esco Jack Lock, including applications or a copy of the latest Esco Drill Jig Catalog with templates and price list will be sent on request. Address Esco Engineering Corp., 4855 Fourth Ave., Detroit, Mich.

The KNURLING of Socket Screws originated with S.P.S. Co. years ago.

STANDARD PRESSED STEEL CO.
JENKINTOWN, PENNA. box 600
— BRANCHES —
BOSTON • DETROIT • INDIANAPOLIS • CHICAGO • ST. LOUIS • SAN FRANCISCO

UNBRAKO
Reg. U. S. Pat. Off.

SOCKET HEAD CAP SCREWS
THEY'RE KNURLED

Helping to protect the machinery that makes America strong, "Unbrako" Screw Products are famous for KNURLING . . . an advantage that, to you, means speed-up and trouble-saving all along the line.

With the popular Knurled Socket Head Cap Screws, the greasiest fingers gear right to the knurling . . . run the screw down faster and farther without slip or annoying lost motions. Knurling also permits quick, easy locking after countersinking!

Make your next order "Unbrako". It pays.

Need More Mac-its?
. . . here's a way
With Defense orders calling for more and more alloy steel screws, Mac-it machines are kept busy producing at top speed.
You can get more Mac-its — through increased production — by specifying standard sizes wherever possible.
Fewer sizes mean fewer machine changes and longer running time.
So get your orders placed now for future delivery by calling your distributor today.
8
THE STRONG CARLISLE & HAMMOND CO., Cleveland, Ohio

"Cylinder Interchangeability"

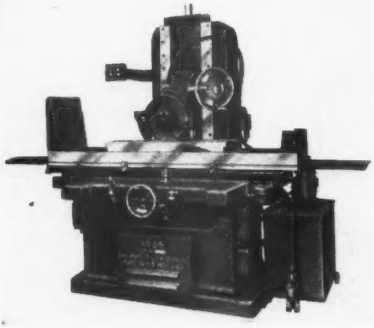
(Continued from Page 68)

the material or a 2.77 ounce cylinder giving 43,000 psi on the material.

The injection cylinder unit is designed so that it can easily be swung clear of the machine; thus making the operation of changing cylinders an easy one. With the injection cylinder swung out as shown in Fig. 2, the cylinder can be easily removed by disconnecting the wires from the heating cylinder and removing the four bolts which hold the cylinder to the cross arm. The cylinder can then be lowered and the desired cylinder raised into its place.

Each cylinder is equipped with its own plunger which is easily engaged in the coupling shown in Fig. 2, when the cylinder is swung back into the operating position. This flexibility of design in the Lester Machine often makes it possible for the molder to cover with one Lester Machine, a field of work which ordinarily requires several machines.

For additional information write to the Index Machinery Corporation, 49 Central Avenue, Cincinnati, Ohio, exclusive distributors for the Lester Automatic Injection Molding Machines in the United States.



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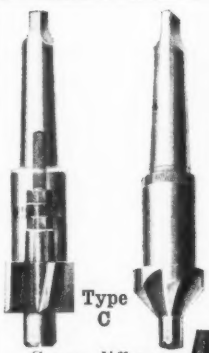

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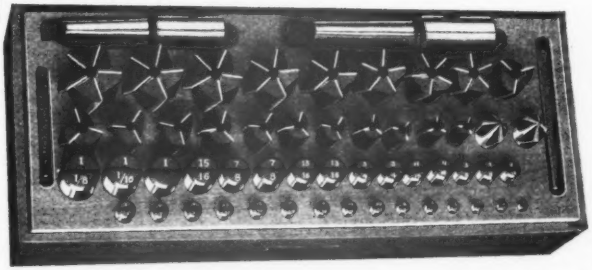

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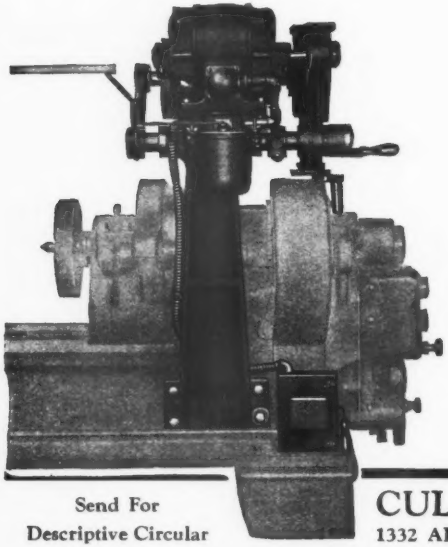

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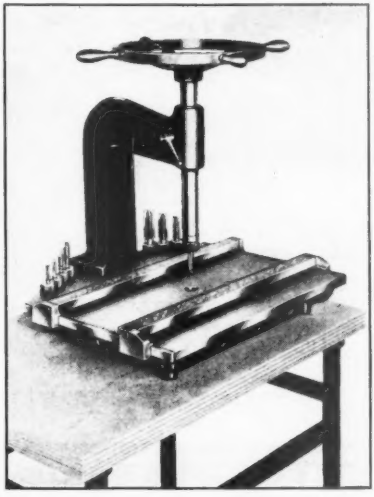

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Denning Mfg. Co., The, 1775-81 E. 87th St., Cleveland, Ohio.
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Federal Tool Corp., 400 N. Leavitt St., Chicago, Ill.
Knu-Vise, Incorporated, 16841 Hamilton Ave., Highland Park, Michigan.
Star Machine & Tool Co., 9320 Woodland Ave., Cleveland, Ohio.
Variety Machine & Stamping Co., The, 12695 Elmwood Ave., Cleveland, Ohio.

STAMPS—Steel
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Darwin & Milner, Inc., 1260-1264 West Fourth Street, Cleveland, Ohio.
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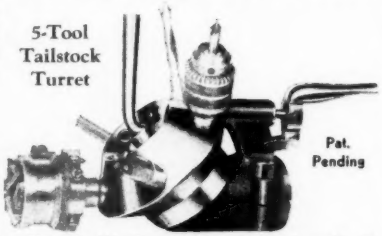

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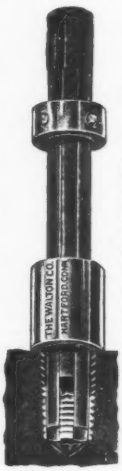

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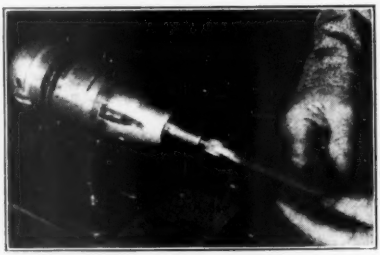

It may be used generally in cases where the work is lighter than the Tool by bringing the work to the Tool, instead of taking the Tool to the work, thus eliminating the necessity of clamping each piece into stationary position in burring and filing operations. This accessory is designed for continuous opera-

(Continued on Page 85)

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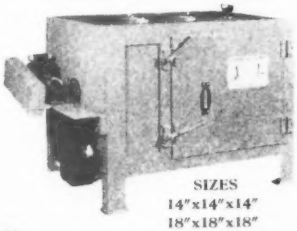

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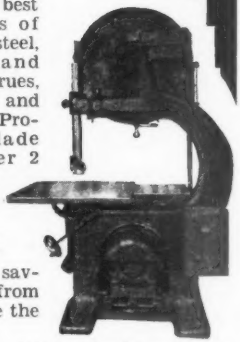

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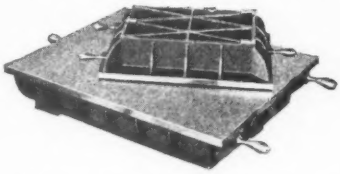

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Multi-Purpose Tool Stand

(Continued from Page 82)

tion on production work.

Literature on the Stand and the Multi-Purpose Tool will be sent by the H & H Research Co., 12538 12th St., Detroit, Mich., at your request.

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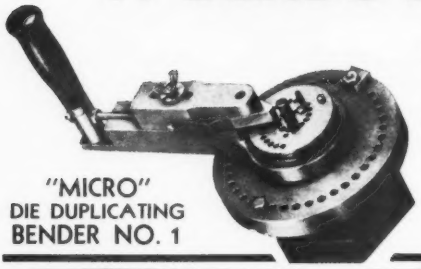

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SHOP AIDS

"METAL PROCESSING" by O. W. Boston, Professor of Metal Processing and Chairman, Department of Metal Processing, University of Michigan, is a revision of the two volumes of "Engineering Shop Practice", long a standard college text. The revision was made with the requirements of short and industrial courses in mind. The material is well organized, the illustrations well chosen and excellent. Questions and bibliographies at chapter ends, a separate list of tables and a 14-page index make the new edition a valuable reference work. "Metal Processing" emphasizes the nomenclature of tools and the subject of machinability. Results of research and practice are coordinated in the extensive data given to show cutting forces, power, tool life, chip formation and surface quality. Published by John Wiley & Sons, Inc., "Metal Processing" (615 pages, $5.00) will become an essential tool for the alert, young shop craftsman as well as the engineering and industrial training program student. Copies may be ordered from The TOOL & DIE Journal.

"GLOSSARY OF METALLOGRAPHIC TERMS" lists 187 terms, phrases and shop designations of commonly used metallurgical nomenclature. More than a definition is given in most cases. A number of line charts and microphotographs add clarity to the text. Cross references to both shop and technical terms at the end of each section give the shopman or student more complete information than usually given in a glossary. While not exhaustive, an attempt has been made to present both or several points of view on controversial points. There is an index to both glossary and page numbers. Published by Chemical Publishing Co., Inc., at $2.00, this book is also available from The TOOL & DIE Journal.

"INDUSTRIAL PLASTICS", SECOND EDITION—This revised and enlarged version treats the many types of plastics available, and their innumerable, vital uses in industry. The author has completely rewritten material on the chemistry of plastics, and has brought up to date all tables, statistics, formulae and charts. Wartime uses of plastics, all modern types of plastics including fibers and bristles, and new data on Japanese and other foreign research are

(Continued on next Page)

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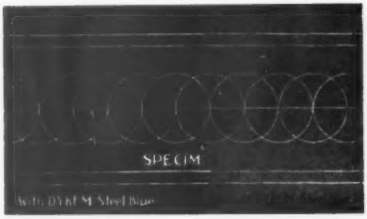

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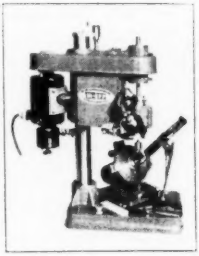

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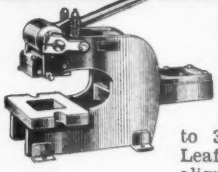

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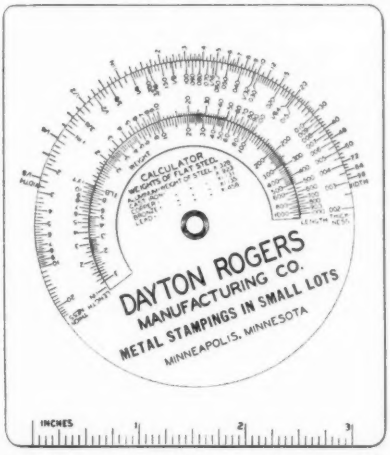

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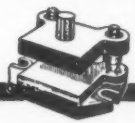

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Advertisers Index

Ace Tool and Die Company 86
Acme Industrial Company 77
AcromarK Corporation, The 81
Advanced Cutting Fluid Co. 71
Ajax Steel & Forge Company 94
Allegheny Ludlum Steel Corporation 9
Allen Manufacturing Company 78
American Broach & Machine Company
American Industrial Publishers 84
American Swiss File and Tool Co. 63
Armstrong-Blum Mfg. Co. .....Back Cover
Armstrong Bros. Tool Company 85
Atlas Equipment Co. 69
Atlas Press Company .....

Baker Bros., Inc. .....
Barth Stamping & Machine Works 86
Bissett Steel Company 81
Black Drill Company 35
Blanchard Machine Company 16
Bokum Tool Company 80
Boyar-Schultz Corporation 93
Builders Iron Foundry 54
Bunell Machine & Tool Company..50 and 86
Busch Company, J. C. 83

Carborundum Company, The .....
Cerro de Pasco Copper Corporation 57
Challenge Machinery Company .....
Chicago Rawhide Mfg. Company 85
Chicago Wheel and Mfg. Company 51
Cleveland Universal Jig Company 87
Colonial Broach Co. .....
Colonial Bushings, Inc. 89
Columbia Tool Steel Company 89
Conrad & Moser 86
Continental Machines, Inc. 29
Cullman Wheel Company 76

Danly Machine Specialties, Inc. 8
Danneman Company, F. C. 91
Darwin & Milner, Inc. 60
Davis Tool & Engineering Company 86
Dayton Rogers Mfg. Company .....
Delta Manufacturing Company 19
Denning Manufacturing Company 86
Despatch Oven Company 37
Detroit Stamping Company 32
Diamond Tool Company 91
Die Supply Company 38
DoAll Co., Inc., The 31
Dresel-Betz Company 86
Drive-All Manufacturing Co...Center Spread
Dumore Company, The .....
Duro Metal Products Company 46
Dykem Company 89

Enterprise Machine Parts Corp. 86
Esco Engineering Corp. 53
Ex-Cell-O Corporation 14

Federal Tool Corp. .....58 and 86
Firth-Sterling Steel Company 47
Ford Motor Co., Johansson Div. 59
Forging and Casting Corporation, The...
.....Inside Front Cover

Gairing Tool Company, The 75
Gallmeyer & Livingston Company 74
General Die & Tool Co. 86
Gerstner and Sons, H. 90
Gorton Machine Company, George .....
Grobet File Company 82

Hack Machine Company .....
Hahn Manufacturing Company 87
Hamilton Tool Company .....87 and 88
Hammond Machinery Builders, Inc. 36
Hardinge Bros., Inc. 3
Hartford Special Machinery Co. 86
Haserodt Machine and Tool, Inc. 62
Holo-Krome Screw Corp. 5
Hovis Screwlock Company 18

Illinois Tool Works .....
Industrial Machine Company, The 87

Jackson Machine & Tool Co. .....61 and 93
Jefferson Machine Tool Company 82
Jessop Steel Company .....
Johnson Gas Appliance Company .....

Kearney & Trecker Corp. 20
Kiffer Tool & Die Co. 87
Knu-Vise, Inc. 90
Koch Test Indicator, The 90
Koestlin Tool & Die Corp. .....12 and 86

Lakeside Steel Improvement Company ... 83
Leach Machinery Company, H. .....
Leslie Welding Company 90
Linderme Machine and Tool Company ..
Lufkin Rule Company 85
Lydon Brothers 83

M-B Products .....
Majestic Tool & Mfg. Company ..86 and 94
Marburg Bros., Inc. 61
Masonite Corporation 17
McGonegal Mfg. Company .....
McKenna Metals Company 33
McKinney Tool & Manufacturing Co. ... 87
Michigan Chrome and Chemical Company 84
Micromatic Hone Corporation .....
Mohr-Lino-Saw Company .....

Noble & Stanton 87
Norton Company 13

Ohio Tool Company .....6, 7 and 87
Oliver Instrument Company 62
O'Neil-Irwin Mfg. Company 88
Onsrud Machine Works, Inc. .....

Paramount Tool Company 87
Peters Company, The .....
Phoenix Machine Company 87
Precision Spring Corp. .....
Precision Tool Company, The 91
Producto Machine Company, The 10
Putnam Tool Company .....Front Cover

Racine Tool and Machine Company 15
Rane Tool Co., Inc. 86
Robbins Engineering Company 86
Royal Oak Tool & Machine Company ... 86
Ryerson and Son, Inc., Joseph T. .....

Scherr Co., Inc., George 55
Schraner, A. P., & Company 87
Severance Tool Company 56
The Smith Power Transmission Co. 46
Sommer & Adams Co. .....87 and 95
South Bend Lathe Works 11
Standard Pressed Steel Company 73
Star Machine & Tool Company ..58 and 87
Starrett Company, L. S. 34
Strong, Carlisle & Hammond Co. 74

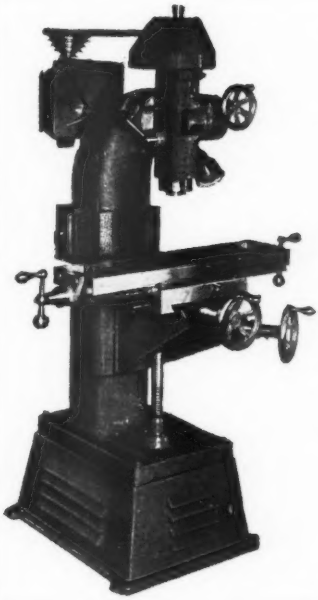
Tannewitz Works, The 83
Taylor Mfg. Company 90
Timken Roller Bearing Company .....
Tomkins-Johnson Company .....
Tools & Gages, Inc. .....45 and 87

Ultra Lap Machine Company .....
Universal Engineering Company .....

Variety Machine & Stamping Company.. 87
Viking Tool & Machine Corp. ....79 and 86

Walls Sales Corporation 91
Walton Company 82
Wayne Chemical Products Co. 69
Wheelock, Lovejoy & Company 84
Wittek Manufacturing Company 71

Yohe Supply Co., Wm. S. 91



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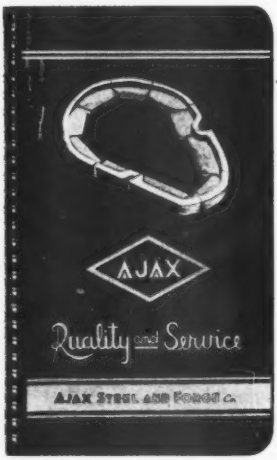

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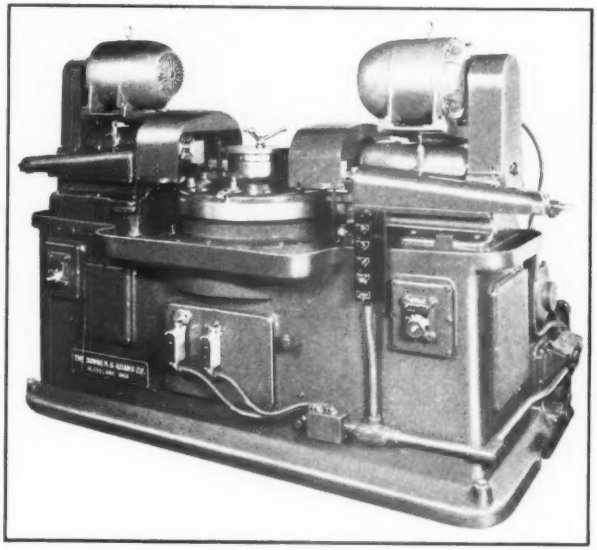

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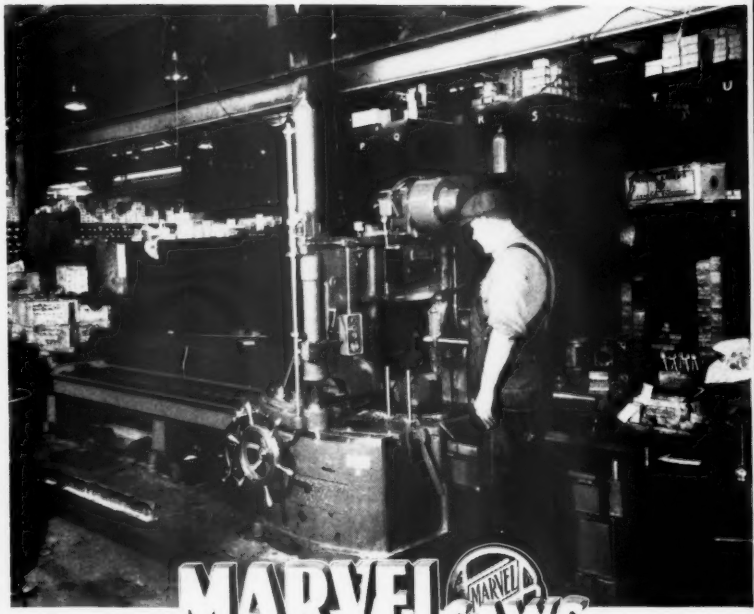

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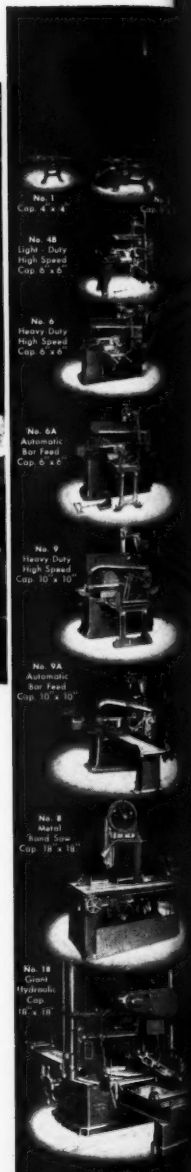

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